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ABSTRACT

This curriculum guide contains instructional materials for a program that provides students with job skills in meat and poultry processing. The curriculum consists of 10 units that cover the following material: orientation to meat and poultry processing; maintaining plant facilities; equipment and equipment maintenance; purchasing livestock for slaughter; livestock slaughter; quality and yield grading; fabricating carcasses and box meat; poultry processing; curing, smoking, and sausage making; and pricing and marketing aspects of meat products. Each of the instructional units includes some or all of the basic components of a unit of instruction: performance objectives, suggested activities for the instructor, extensions and options, information sheets, student supplements, transparency masters, instructional supplements, activity sheets, job sheets, practical tests, written test, and answers to assignment sheets and written test. Units focus on measurable competencies and are meant to be used for more than one class period. A basic skills documentation matrix correlates skills with units of instruction. (KC)

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Teacher Edition

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Meat and Poultry Processing

Developed by the
Curriculum and Instructional Materials Center
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Oklahoma Department of Vocational and Technical Education

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Curriculum and Instructional Materials Center

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FOREWORD

The Oklahoma Department of Vocational and Technical Education is committed to excellence. Examples of this commitment can be seen in the quality services the department offers to the students of Oklahoma. The agricultural education programs offered through the Oklahoma Department of Vocational and Technical Education are one example of excellence in action.

Meat and poultry processing contributes to the economy of the state and directly impacts the lives of Oklahomans. Qualified, prepared employees in the meat processing industry can provide the state with goods and services which are in great demand.

This publication provides valuable information and competencies for students aspiring to careers in the meat and poultry processing industry.

Eddie Smith, State Supervisor
Agricultural Education
Oklahoma Department of Vocational
and Technical Education

PREFACE

The world we live in changes daily and new trends emerge on a regular basis. We must keep abreast of these trends and the implications they bring forth if we are to be successful in the agricultural field. Technology and the vast amount of information at our fingertips allows us to work with these trends and implications to provide high quality food for the world. The meat and poultry processing industry is one area that has been greatly impacted by the changes we have experienced in the past 20 years.

Increased consumer awareness and technological advances have brought changes to the meat and poultry processing industry. Today's meat processor must be knowledgeable, capable, and efficient if he/she wants to be successful in the meat processing industry.

Students who complete the Meat and Poultry Processing curriculum will be better equipped to serve the needs of the consumer of today and the consumer of tomorrow. This curriculum will better prepare them for success in the meat and poultry processing industry.

Randy Kirk
Curriculum Development Specialist
Curriculum and Instructional
Materials Center

ACKNOWLEDGEMENTS

The Curriculum and Instructional Materials Center could not be the recognized leader in curriculum development without the help of industry experts and educators. The validation committee for Meat and Poultry Processing did a very thorough job in analyzing the material and checking for technical accuracy. To those individuals, my sincere thanks. They are:

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The drawings of meat cuts in Unit VII are courtesy of the Instructional Materials Service, Texas A & M University, College Station, Texas.

Special thanks goes to Claire Dickey, technical writer at CIMC for her hard work on this project.

Finally, I would like to thank the writers and the editors of this publication, Kenneth Decker, Ellen Beeby, David Sorrell, Les Kauer, and Dr. Sandra Dutreau Perky Williams.

Randy Kirk
Curriculum Development Specialist
Curriculum and Instructional
Materials Center

USE OF THIS PUBLICATION

INSTRUCTIONAL UNIT

Meat and Poultry Processing contains ten units. Each instructional unit includes some or all of the basic components of a unit of instruction: performance objectives, suggested activities for the teacher, information sheets, job sheets, practical tests, written tests, and answers to assignment sheets, and written test all of which are included in the instructor edition. The student workbook includes the objective sheets, information sheets, supplements, assignment sheets, and job sheets. Practical tests, and written tests may be duplicated for classroom use or additional copies may be purchased by calling 1-800-654-4502, in Oklahoma 1-800-522-5810, ext. 589.

All of the unit components "zero in" on measurable and observable learning outcomes. Instructors are encouraged to supplement, personalize, localize, and motivate with these materials to develop a complete teaching/learning process.

Units of instruction are designed for use in more than one lesson or class period of instruction. Careful study of each unit of instruction by the instructor will help him or her determine the following:

- Amount of material that can be covered in each class period.
- Skills that must be demonstrated.
  - — Supplies and equipment needed
  - — Amount of class time needed for demonstrations
  - — Amount of time needed for student practice
- Supplementary materials, including print and non-print media, that must be ordered.
- Resource people who must be contacted.

Objective Sheet (white pages)

Each unit of instruction is based on the performance needed for successful employment in an occupational area. Performance objectives are stated in two forms: unit objectives, stating the subject matter to be covered in a unit of instruction, and specific objectives stating the performance necessary to reach the unit objective.

The unit objective states the overall goal of the unit. It tells what the student should be able to do and what standard will be used to see whether the student can do it. Specific objectives outline the teaching sequence of the competencies required to meet the unit objective.

The objectives should be provided for students and stressed throughout the teaching/learning process. This will help answer any questions concerning performance requirements for each instructional unit. The objective can also help determine teaching strategies and instructional methods. Instructors should prepare for each unit by deciding how each objective can be best taught.

Instructors should feel free to modify, delete, or add objectives in order to meet the needs of the students and community. When objectives are.added, the instructor should remember to supply the needed information, assignment and/or job sheets, and criterion test items.

Suggested Activities (pink pages) **Instructor's Edition only**

This component is included only in instructor material. The suggested activities page assists the instructor during the preparation stage of the teaching/learning process by providing suggestions for delivery, application, and evaluation during the instructional process. The instructor should read the suggested activities before teaching the units to allow time to obtain supplemental materials, prepare audiovisual materials, and contact outside resources. Duties of the instructor will vary according to the particular unit.

References used in the development of each unit are listed in the "Suggested Resources" section, along with print and non-print media that may be used to teach the unit. These materials can be used by the instructor to supplement his or her knowledge of the subject area or to help students with particular interests or occupational objectives in the area covered.

Information Sheets (green pages)

The information sheet provides "must know" content essential for meeting the cognitive objectives on the knowledge and comprehension level of Bloom's taxonomy of educational objectives. The information sheet serves as an excellent guide for presenting background knowledge necessary to develop the skills specified in the unit objective. It also may be used for coordination activities and advisory committees.

Students should read the information sheet before the information is discussed in class. Space is provided in margins for students and instructors to ad notes that supplement, localize, personalize, or provide motivation for each unit.

The information sheet may include notes, cautions, or warnings. These should be discussed carefully and thoroughly. Notes are short verbal additions to the information sheet or procedural outline that provide nice-to-know and decision-making information. A note may tell the student what to watch for or to consider at a given step. It may explain when a step may not be applicable. Notes offer guidance that may help the student understand the process and do it more efficiently. **Cautions** are advisories that tell the student how to avoid causing minor personal injury or equipment damage. **Warnings** are advisories that tell the student to avoid serious personal injury or death to the student persons in the workplace, or users of the project or the procedure.

Supplements (Green Pages)

Supplements include instructions that could be used for solving problems or reinforcing the enrichment of learning. The information presented in a supplement may consist of tables, charts, written information, forms, or other information students will need in order to complete one or more of the assignment or job sheets. While supplements are not tested over directly, they may be used to assist in meeting the performance objectives.

Assignment sheets are intended to provide students with practice in exercising higher-order thinking skills. Often, assignment sheets will contain case studies or story problems or other situations in which the student must analyze the circumstances and determine correct responses. Assignment sheets may be given to the students for completion in class or for homework. Answer sheets are provided.

Assignment Sheets (Tan Pages)

Assignment sheets provide students with information and exercises to problems that address learning levels at or above the application level of Bloom's taxonomy. Assignment sheets provide written exercises for instruction and practice of a specific objective. The introduction to the assignment sheet explains how the assignment sheet relates to the subject area and unit objectives and may provide instructional information or refer students to another component for such information.

Job Sheets (blue pages)

Job sheets are another important segment of a unit of instruction. The job sheets provide a list of equipment, tools, and materials needed to complete a manipulative or psychomotor skill. They describe a step-by-step procedure to complete each task or job. Diagrams, photographs, and illustration are provided to assist students in achieving the skill.

The instructor should demonstrate the procedure outlines in each job sheet. Further more, the instructor needs to localize the procedure according to the equipment and supplies available in the local lab or shop situation. Job sheets also furnish potential employers with a picture of the skills being taught and the performances they might reasonably expect from a person who has had this vocational instruction.

Practical Tests (yellow pages) **Instructor's Edition only**

The practical tests are designed to assist the instructor in the evaluation of the psychomotor activities (job sheets). The practical test provides instructors with a valid mechanism for determining a student's level of ability in performing the procedure stated on the job sheet.

Written Test (yellow pages) **Instructor's Edition only**

This component provides criterion-references evaluation of every objective listed in the unit of instruction. It is crucial to note that both paper-pencil and performance objectives must be evaluated. If objectives have been added, deleted, and modified, appropriate changes should be made on the test.

The test may be written or oral. It is recommended that the tests be divided into shorter tests covering three or four objectives at a time and given soon after those objectives have been covered.

The acceptable response on a unit test, eighty-five (85) percent in most units, may be raised or lowered to fit the topic or students' ability levels. The percentage applies to the overall score, not to each individual question. The final unit grade should be obtained by using the "paper-pencil" score along with teacher evaluations of student demonstrations of the desired skills.

Answers to Assignment Sheets and Written Tests (pink pages) **Instructor's Edition only**

These components are designed to assist the instructor in evaluation of student performance. They are available in the teacher's edition only.

PAGE NUMBERING

Each publication for the Curriculum and Instructional Materials Center is usually assigned a specific abbreviation. *Meat and Poultry Processing* has not been abbreviated. Each unit will be recognized by the unit number in roman numerals. Each unit in the publication begins with page 1. Each page number gives the component name, book title, unit number, and page number within the unit. Since CIMC publications are loose-leaf, this system of page numbering was recently adopted so that pages from different manuals would not get mixed up. The page number for the objective sheet in Orientation to Meat and Poultry Processing, which is unit I, would look like this:

> OBJECTIVE SHEET - Meat and Poultry Processing
> I - 1

METHODS OF DISSEMINATING MATERIAL

For best results, provide student materials for each student. Student workbooks contain objective sheets, information sheets, supplements, transparency masters, activity sheets, assignment sheets, and job sheets. Pretest, practical tests, and written tests are packaged separately for students, and can be stored until needed. Students should be allowed to take their materials home at the end of the course.

TEACHING METHODS

Keeping students motivated is a challenge. Supplement the objectives by providing the "why," personal experiences, and current information. If you are going to teach the material in a group setting, prepare for the unit be deciding the best way to teach each objective and allow for student input.

If you are going to follow the plan for individualized instruction, provide opportunities that will allow each student to become involved in planning for and being responsible for his or her own education.

COMPETENCY PROFILES

A competency profile is available for each CIMC publication. Competency profiles document student performance. The profile contains a list of the specific job competencies that a student should achieve before leaving the training program. Profiles should be distributed as required.

CORRECTIONS AND SUGGESTIONS

The Curriculum and Instructional Materials Center (CIMC) wants to provide vocational instructors and students with materials that are accurate and effective. Although the CIMC strives to maintain the highest standards of development and production, oversights occasionally do occur. If you find any errors in this or other CIMC publications, or have suggestions for improving their usefulness in vocational programs, please notify the CIMC staff. One easy way of pointing out errors is to make a photocopy of the affected page and to indicate the correction on the copy. Mail this information to the CIMC, where it will be used to correct the publication before the materials are reprinted.

To ensure that the material is updated on a timely basis, notify the CIMC of necessary corrections as soon as possible after discovering the error. Do not assume that someone else will notice the error and inform the CIMC; other users may be making the same assumption. Please send corrections and recommendations for improving this publication to the following address:

Curriculum and Instructional Materials Center
Oklahoma Department of Vocational and
Technical Education
1500 West Seventh Avenue
Stillwater, Oklahoma 74074-4364

BASIC SKILLS IN CURRICULUM

Since its inception in 1969, the Curriculum and Instructional Materials Center (CIMC) of the Oklahoma Department of Vocational and Technical Education has provided quality, competency-based instructional materials for vocational training programs. During this time, the CIMC has been mindful of the importance of reinforcement (and sometimes remediation) of students' academic skills as they progress through vocational training, and has always included activities in its materials to enhance and promote use of these skills.

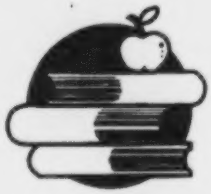
In response to changing job requirements, federal and state legislatures are enacting laws setting stringent basic skills requirements for nonvocational and vocational education. State legislatures are increasing basic skills accountability for teachers and school administrators. The recently enacted Carl D. Perkins Vocational and Applied Technology Education Act Amendments of 1990 (P.L. 101-392) mandates academic skills development in vocational training. In addition, business and industry are delivering the message clearly to educators that vocational competence now requires increased strength in the basic skills.

As noted earlier, it is not new for CIMC materials to contain information and activities that develop basic skills competencies in students taking vocational training. What is new is the documentation or flagging of basic skills in CIMC materials, and further enhancement of basic skills activities. To accomplish this, the CIMC has developed a "Five Point Approach to the Integration of Basic Skills into the Curriculum." Following is a brief description of this process.

I. Basic Skills Icons

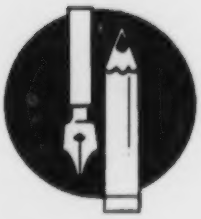
To assist teachers and students in identifying activities that promote basic skills development, the CIMC has implemented a marking system that uses simple graphic symbols, or icons, to denote which of nine general basic skill categories is being emphasized. These icons are located in the left margins of assignment, activity, and job sheets. The nine basic skill areas are as follows:

Reading Skills



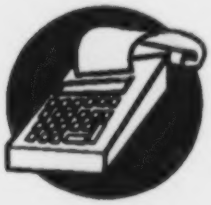
The activities identified by this icon deal specifically with developing reading skills in an applied, job-related context. These range from general information-gathering activities to tasks requiring use of specific technical reference materials.

Writing Skills



Tasks identified with this icon promote development of skills in written communication ranging in complexity from filling out forms to the written expression of ideas and concepts related to vocational exploration or performance.

Mathematics Skills



This icon identifies activities that develop vocationally related skills in computation; measurement and estimation; selection and application of appropriate mathematical process; and collecting, displaying, or interpreting data.

Science Skills

The science icon marks activities that are related to the development of skills in either the physical or biological sciences. These skills stress occupationally related applications of science and technology.

Oral Communication Skills

This icon identifies activities that promote development of effective speaking and listening skills. They include practice in such areas as speaking techniques, word choice, nonverbal messages, use of communication media, and using active listening techniques.

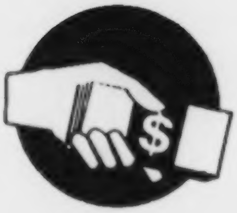
Interpersonal or Relating Skills

Activities that deal directly with skills in relating to others are marked with this icon. This includes areas such as group processes and dynamics, negotiation, dealing with conflict, and leadership/motivation.

Creative Thinking and Problem Solving Skills

This icon identifies activities that stress development of higher-order thought processes such as problem identification and analysis, lateral thinking, evaluating alternatives/outcomes, and developing solutions.

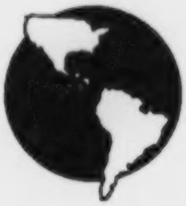
Employability Skills



Activities marked with this icon relate to competencies required to obtain employment and develop a career. These competencies include specific occupational tasks and more general items such as career planning, job search, business etiquette, and maturing in one's work environment.

Social Studies Skills

This icon is used to identify activities that stress competencies in fields relating to human society and its distribution and relationships. This includes all the social sciences such as history, economics, geography, demographics, current events, cross-cultural studies, consumer issues, environmental issues, and ethical concerns in science and technology.



Some activities in the CIMC materials develop skills in more than one of the nine basic skill areas. In cases where the relative strengths of the skill elements are clearly discernable, the icon used is the one judged to be the primary, or the most heavily emphasized, activity. When there is no clear-cut difference between importance of skill area, multiple icons are used.

II. *Enablers*

Once the **general** basic skill activity has been identified by an icon, the CIMC takes the process one step further by indicating the **specific** skills that are addressed in an activity. This is accomplished by using enabling skills, or "enablers."

Lists of enablers, or specific skills required for each activity, have been developed at CIMC for each of the nine basic skills areas. The enablers have been grouped into sets of related skills under each icon. The list of general skill categories under each icon is as follows:

Reading Comprehension Skills
Research and Reference Skills
Functional Reading Skills

Language Skills
Composition Skills
Research Skills
Functional Writing Skills

Operation and Calculation Skills
Math Application Skills
Data Analysis and Display Skills
Functional Math Skills

General Science Skills
Life Science Skills
Physical Science Skills
Earth Science Skills

Oral Presentation Skills
Listening Skills
Interactive Communication Skills

General Relating Skills
Teamwork/Cooperative Skills
Leadership/Influencing Skills

Enablers
Cognitive Activities Skills

Job Search/Selection Skills
Job Acquisition/Development Skills

Information Analysis Skills
Social Studies Application Skills
Functional Social Studies Skills

Applicable enablers, grouped under their general categories, are listed beneath each icon in the left-hand margin of the activity, assignment, and job sheets. For example, an exercise that requires a student to conduct library research would make necessary the use of specific reading comprehension and research and references skills. The basic skills that the exercise is promoting would be depicted in the margin as follows:

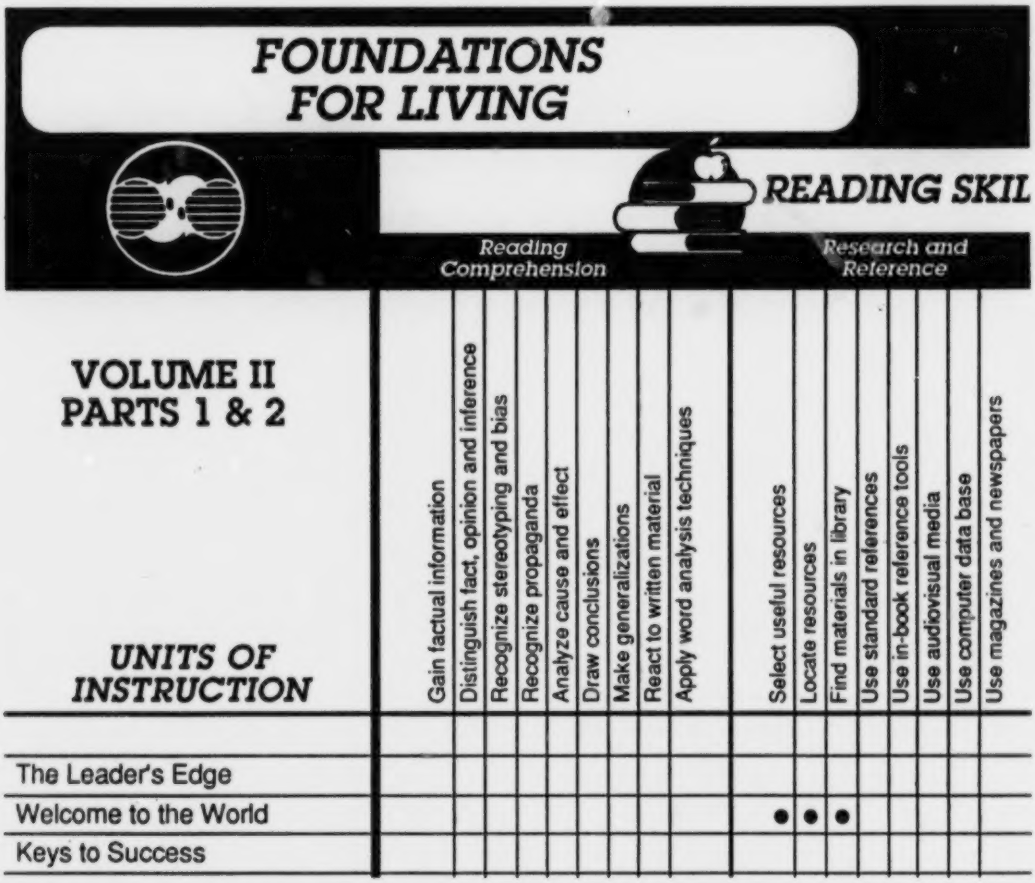
Reading Comprehension Skills
- Gain information

Research and Reference Skills
- Select useful resources
- Find materials in library

[Text]

III. Basic Skills Documentation Matrix

The third component of the CIMC basic skills instructional plan is the "Basic Skills Documentation Matrix." This attractive 22" x 34" wall hanging graphically depicts the basic skills in a CIMC curriculum guide unit by unit. It should be helpful to teachers in planning their instruction, and to administrators as documentation that basic skills **are** being addressed during the vocational training. Two copies of the matrix are included with each order of a teacher's book.



FOUNDATIONS FOR LIVING

READING SKIL

VOLUME II
PARTS 1 & 2

UNITS OF INSTRUCTION	Reading Comprehension									Research and Reference							
	Gain factual information	Distinguish fact, opinion and inference	Recognize stereotyping and bias	Recognize propaganda	Analyze cause and effect	Draw conclusions	Make generalizations	React to written material	Apply word analysis techniques	Select useful resources	Locate resources	Find materials in library	Use standard references	Use in-book reference tools	Use audiovisual media	Use computer data base	Use magazines and newspapers
The Leader's Edge																	
Welcome to the World										●	●	●					
Keys to Success																	

Matrices have been developed for most CIMC publications. For more information on those available for other programs, call CIMC Resale, 1-800-522-5810 Ext. 589 in Oklahoma, and 1-800-654-4502 in all other states.

IV. *Suggested Evaluative Criteria*

In some instances a "Suggested Evaluative Criteria" chart is included on assignment sheets to assist the teacher in scoring the basic skills portion of the assignment. As the title implies, these are suggestions only, and should be of use to the vocational teacher who has little experience or training in teaching or evaluating academic exercises such as composition writing. The criteria will usually appear with writing, oral presentation, or major project assignments. For example, suggested evaluative criteria given for a writing assignment would recommend number of points to be assigned for neatness of report, content, use of note cards, spelling, and grammar.

SUGGESTED
EVALUATIVE CRITERIA

1.	Note cards with proper information	10 points
2.	Bibliography	5 points
3.	Footnotes	5 points
4.	Language skills (grammar, spelling, capitalization, punctuation, complete sentences)	15 points
5.	Composition skills (topic sentences, introductory paragraph)	15 points
6.	Content	45 points
7.	Neatness of report	5 points
	TOTAL	100 points

V. Instructional Supplement

When appropriate, a "Basic Skills Instructional Supplement" is appended directly behind assignment, activity, or job sheets in the teacher's book. This supplement is a tool for the instructor to use in helping students apply the basic skills in their assignments. Some supplements are appropriate for use with all students; some are for use only with those students who do not understand the academic skills called for in the exercise. The supplement will be similar in format to the Suggested Activities portion of the CIMC materials.

BASIC SKILLS	***USE AUTOMOTIVE SERVICE REFERENCE MATERIALS*** ***1***
INSTRUCTIONAL SUPPLEMENT	Skill development for: MATHEMATICS • Introduce the assignment to the students by discussing with them the purpose of graphs. Stress the ability of graphs to represent numerical data in easy-to-read, visual format. • Use Student Supplement 3, "Interpreting Graphs," to review with students the major types of graphs and how they should be read.

******

The five basic skills components:

- Icons
  - Enablers
    - Matrix
      - Suggested Evaluative Criteria
        - Basic Skills Instructional Supplements

are currently being phased into CIMC publications in graduated stages. While not all publications presently contain all five components, missing components will be added as books are revised and reprinted.

Lynna Ausburn, Ph.D.
Development Coordinator

Billie Frazier
Copy Specialist

USING THE CIMC WRITTEN TESTS AS PRETEST AND POSTTEST TO MEASURE STUDENT PERFORMANCE GAINS

When you examine this book, you will notice that separate written pretests are no longer included in the units of instruction. Each CIMC unit now contains only a single written test. This test can be used as **both** pretest and posttest by giving it once before students start a unit and again when they have completed the unit.

DOCUMENTING STUDENT PERFORMANCE GAINS

The reason for using a single instrument as both pretest and posttest is so that direct comparison of each student's competencies before and after instruction can be made accurately. This comparison enables precise calculation, documentation, and evaluation of student **performance gains**.

Accurate performance gains analysis is an important requirement of the new Carl Perkins legislation for vocational education. Teachers can make an important contribution to the performance accountability mandated by the new federal legislation by carrying out accurate performance gains analysis for their students, and making this data available to students, parents, and administrators.

This analysis is easy to do and requires only simple calculations and record keeping. The new CIMC unit tests and the instructions given here for pretest/posttest analysis are designed to help teachers keep accurate performance gains data with minimal effort.

WHY SHOULD BOTH A PRETEST AND A POSTTEST BE USED, AND WHY SHOULD THEY BE THE SAME?

It is only possible to calculate a **gain** in performance if competencies are tested **both** before and after training. The use of a pretest and posttest gives the required "before and after" information, allowing accurate comparison of student performance before and after completing a program of instruction.

Without pretest data, it is impossible to determine how well students could have met the objectives of a program without the benefit of any instruction. It would therefore be possible to incorrectly interpret good student performance on a posttest as gains in ability and knowledge produced by a good instructional program when, in fact, the posttest strength might be due merely to prior knowledge on the part of students. This erroneous conclusion is avoided by use of both pretest and posttest data.

If students cannot meet the objectives of a program prior to instruction but can meet them afterward, it is more likely that performance gain has been made as a result of instruction.

In order to provide data which can be precisely compared, the pretest and posttest **must be identical**. This is why CIMC materials have only one test for each unit. This test is intended to be used as both pretest and posttest.

By giving the written test to all students both before and after you present a unit, you will be ready to make the calculations needed for your analysis of students' performance gains on the unit. There are two techniques you should use for this analysis.

ANALYZING PERFORMANCE GAINS FOR GROUPS OF STUDENTS

The first step to measuring student performance gains on a unit is to examine the gains made by an **entire class or other group**.

The simplest technique for showing posttest gains for a group is to calculate **pass rates** on the unit test. Pass rates are very easy to calculate, and require a minimum of computation.

Pass rates are simple percentages; specifically, the percentage of students who answered each test question correctly.

Matching Test Questions to Objectives

To determine pass rates, the first step is to match each question on the test to a specific objective. This is easy with CIMC instructional materials, because they have clearly specified objectives.

For an example of matching test questions to objectives, look at the chart below. Here, a teacher has decided that test questions 1 and 4 test objective number 1; question 3 tests objective number 2; and test question number 2 tests objective number 3.

OBJECTIVE NUMBER	TEST QUESTION NUMBER
1	1
1	4
2	3
3	2

Calculating Pass Rates

After you have carefully cross-matched test questions and objectives, you are ready to proceed with the calculation of pass rates. You will determine a pass rate for **each test question**. Calculate pass rates with this simple formula:

$$\frac{\text{Number of students who passed the question}}{\text{Number of students in group}} \times 100 = \textbf{Pass Rate} \text{ (\% of the group that passed the question)}$$

Keep in mind that pass rates examine the performance of a **group**. They do **not** provide information about individual students.

Using a Pass Rate Chart

The best way to record, display, and analyze pass rates is in a **Pass Rate Chart**. The chart puts all data in uniform and easily read format and simplifies data analysis. The chart should include pass rates for the group on both the pretest and posttest for all test questions, and should indicate which specific questions relate to each objective. It should also show pass rates for the test as a whole.

Completing a Pass Rate Chart

Below is an example of a Pass Rate Chart.

PASS RATE CHART

OBJECTIVE NUMBER	TEST QUESTION NUMBER	PRETEST PASS RATE	POSTTEST PASS RATE
1	1	0%	100%
1	4	2%	82%
2	3	0%	60%
3	2	4%	92%
TOTAL TEST RATES		100-90% 0% 89-80% 0% 79-70% 0% 69-60% 0% 59-50% 0% 49- 0% 99%	100-90% 60% 89-80% 20% 79-70% 10% 69-60% 5% 59-50% 5% 49- 0% 0%

By looking at the figures on the chart, you can easily see how great the difference in performance is for the class before and after instruction. You can also see which specific objectives and/or test questions caused problems for students. The differences between pretest and posttest pass rates represent performance gains for the group of students.

To complete a Pass Rate Chart, you need to go through a simple sequence of steps and record the information on the chart. A blank Pass Rate Chart is presented on page 11. You may duplicate this chart for your personal use.

To complete a Pass Rate Chart for a CIMC unit of instruction, go through the following steps:

1. Match the test questions on the written test to specific objectives, and fill in the first two columns on the left. These columns are labeled "Objective Number" and "Test Question Number." Some objectives may have more than one test question matched to them.

2. Give the CIMC written test as a pretest, then calculate the pass rate for each test question, using the formula given on page 4. Record the pass rate for each test question in the "Pretest Pass Rate" column.

> **EXAMPLE:**
>
> In a class of 26 students, 3 students got a question correct. Pass rate for the question = (3 ÷ 26) X 100, or 11.5%.

3. Calculate the total test pass rates for the pretest, and fill in these rates at the bottom of the "Pretest Pass Rate" column. Do this as follows:

   a. Calculate the percentage score made by each student on the pretest, using this formula:

$$\frac{\text{Number of points scored by student}}{\text{Number of points on the test}} \times 100 = \text{Percentage Score}$$

> **EXAMPLE:**
>
> A student earns 6 points out of a total of 75 possible on the test. The student's percentage score is (6 ÷ 75) X 100, or 8%.

b. Determine how many **students** earned percentage scores in each of the following score ranges:

100-90%
89-80%
79-70%
69-60%
59-50%
40- 0%

c. Change the **number** of students in each score range into a **percentage** of the total group, using the following formula:

$$\frac{\text{Number of students who scored in an interval}}{\text{Total number of students in group}} \quad \text{X } 100$$

EXAMPLE:

In a group of 32 students, 12 students scored in the interval of 59-50%. The percentage of students who scored in this interval is (12 ÷ 32) X 100, or 37.5%.

4. Give the CIMC written test again as a posttest, then repeat steps 2 and 3 above. Fill in the appropriate figures in the "Posttest Pass Rate" column for each test question, and for the total test rates.

ANALYZING PERFORMANCE GAINS FOR INDIVIDUAL STUDENTS

After completing the Pass Rate Chart to analyze the performance gains for an **entire group** of students on a test, it is a good idea to calculate a measure of performance gains for **each individual** student. A simple and accurate way to do this is to calculate a **modified percentage gain score** for each student.

The modified percentage gain score for each student should be recorded in a **Modified Gain Record Chart**. This chart makes an easy reference for evaluating the gain performance of each student. A blank Modified Gain Record Chart appears on page 12. You may duplicate this chart for your personal use.

Calculating Modified Percentage Gain Scores

Modified percentage gain scores can be calculated at the top of each student's test paper. Calculate gain scores as follows:

1. Calculate the student's **Pretest Percentage**, or the percentage score the student made on the pretest. Use this formula:

$$\frac{\text{Number of points scored by student}}{\text{Number of points on the test}} \quad \text{X } 100$$

2. Subtract this percentage from 100%. The resulting figure is the **Percentage Available** to the student for improvement on the posttest.

3. Calculate the **Posttest Percentage**, or percentage score the student made on the posttest, using the formula given in step 1.

4. Subtract the **Pretest Percentage** from the **Posttest Percentage**. This figure is the **Percentage Gained** on the posttest.

5. Divide the **Percentage Gained** (step 4) by the **Percentage Available** for gain (step 2). This figure is the ***MODIFIED PERCENTAGE GAIN***. It shows what portion of the potential increase the student **actually gained**.

EXAMPLE:

As an example of the calculation of modified percentage gain scores, suppose a student made 10% on the pretest and 90% on the posttest. The calculation would be as follows:

1. The **Pretest Percentage** score of 10% was determined using the percentage formula given in step 1 on page 8.

2. **Percentage Available** to the student for improvement on the posttest:

   100%
   - 10% **(Pretest Percentage)**
   90% **(Percentage Available)**

3. The **Posttest Percentage** of 90% was determined using the percentage formula.

4. **Percentage Gained** on the posttest:

   90% **(Posttest Percentage)**
   - 10% **(Pretest Percentage)**
   80% **(Percentage Gained** on posttest)

5. The **MODIFIED PERCENTAGE GAIN** score:

80% **(Percentage Gained)** ÷ 90% **(Percentage Available)** X 100 = 89%

This student made a modified gain score of 89%. That means that the student earned 89% of the improvement that was possible for him/her on the posttest, based on his/her pretest score.

Using a Modified Gain Record Chart

A modified percentage gain score should be calculated for each student on each unit test. Enter the gain scores on a Modified Gains Record Chart like the one on page 12. (Copy this form for your own use.) By using this form, you can easily check the gain scores and analyze the performance gains made by your students on each unit of instruction.

If most students have made good performance gains from your instructional program, there will be a large number of high modified gain scores. This would indicate that your students are gaining from your program **most** of what they did not know before they received instruction.

****

You know how to verify gains in performance on CIMC unit tests, both for groups of students and for individual students. The procedures you have learned are based on:

- giving **pretests and posttests** which are identical
- calculating and analyzing **group pass rates** for learning objectives, for individual test questions, and for entire unit tests (Complete a Pass Rate Chart for each unit)
- calculating and analyzing **students' modified percentage gain scores** to determine their individual performance improvement (Complete a Modified Gain Record Chart for each unit)

By using these basic procedures you will gain accurate and objective information about what specific skills your students are mastering and how much they are improving as they proceed through your program. This information will be valuable in documenting your students' achievement gains, and in increasing accountability to students, parents, administrators, and government.

PASS RATE CHART

CLASS ______________________________

TEST/UNIT TITLE ______________________________

TEST DATE ______________________________

OBJECTIVE NUMBER	TEST QUESTION NUMBER	PRETEST PASS RATE	POSTTEST PASS RATE
TOTAL TEST PASS RATES		100-90% ___% 89-80% ___% 79-70% ___% 69-60% ___% 59-50% ___% 49-0% ___%	100-90% ___% 89-80% ___% 79-70% ___% 69-60% ___% 59-50% ___% 49-0% ___%

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MODIFIED GAIN RECORD CHART

CLASS ____________________

TEST/UNIT TITLE ____________________

TEST DATE ____________________

STUDENT'S NAME	PRETEST PERCENTAGE	POSTTEST PERCENTAGE	MODIFIED PERCENTAGE GAIN

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OBJECTIVE SHEET

ORIENTATION TO MEAT AND POULTRY PROCESSING

I

INTRODUCTION

The meat and poultry processing industry is growing and continually striving to meet the changing needs of consumers. Technology has brought about faster, more efficient processing methods that have helped facilities increase profits while keeping retail prices low. The meat and poultry processing industry offers a variety of job opportunities ranging from local retail meat departments to large industrial packing and processing facilities.

UNIT OBJECTIVE

After completing this unit, the student will be able to identify trends and job opportunities in the meat and poultry processing industry. The student will demonstrate these competencies by completing assignment sheets and the written test with a minimum of 85 percent accuracy.

SPECIFIC OBJECTIVES

After completing this unit, the student will be able to

1. Match terms associated with meat and poultry processing to their correct definitions.
2. Select from a list true statements concerning the history of processing.
3. Select from a list true statements concerning international trade.
4. Complete statements concerning trends in slaughter and processing.
5. List trends apparent in retail outlets.
6. List trends that have appeared in response to consumer needs.
7. Select factors affecting consumer food spending.
8. Select from a list true statements concerning reasons consumers spend more money for food purchases away from home.
9. Select from a list true statements concerning food prices in the meat and poultry industry.
10. List skills important in the meat cutting profession.

11. List the major categories of job classifications in the meat cutting profession.

12. Select from a list true statements concerning career opportunities in the meat cutting profession.

13. Analyze your food consumption habits. (Assignment Sheet 1)

14. Complete a list of pricing information for meat products. (Assignment Sheet 2)

15. Analyze job opportunities in a packing or processing facility. (Assignment Sheet 3)

PREPARATION

- Obtain materials to supplement unit.

  NOTE: See Suggested Resources.

- Review instructional outline for this unit. Modify time frames to suit class needs and plan activities for each class period.

- Study specific objectives to determine those you will cover in your presentation. Decide which objectives should be taught to which students.

- Determine scope and sequence of objectives that you add. Design and develop support materials, including evaluation techniques, for additional objectives.

- Determine how you will schedule time for students to demonstrate competence in the required procedures.

- Make arrangements for guest speakers. Supply speakers with specific objectives and other appropriate sections of the unit.

- Arrange to tour a meat or poultry processing facility.

- Prepare classroom.

  - Put up posters, charts, and other items dealing with meat and poultry processing.

  - Have articles, brochures, and other literature dealing with meat and poultry processing available for students.

DELIVERY

Objectives 1 through 3

- Prepare a display of magazines and newsletters related to the meat and poultry processing industries.

- Have students collect articles on meat and poultry processing facilities and new developments within the industry.

Objectives 4 through 9

- Tour a retail meat department or local meat packing company.

  NOTE: For locations of meat processing plants contact: Oklahoma State Department of Agriculture, 2800 North Lincoln, Oklahoma City, OK 73105, (405) 521-3741.

- Invite a representative from a retail meat department of a supermarket or a local meat packing company to speak to the class about recent trends in meat processing and retail sales.

Objectives 10 through 12

- Tour a meat or poultry processing facility.
- Invite representatives from retail or wholesale processing and packing facilities to speak to the class about job opportunities, job responsibilities, and career opportunities in their respective firms.

APPLICATION

Objectives 13 through 15

- Use Assignment Sheet 1 to help students analyze their food consumption habits.
- Use Assignment Sheet 2 to help students analyze and compare the cost of various meat products.
- Use Assignment Sheet 3 to help students analyze job opportunities in a packing or processing facility.

EVALUATION

Written Test

- Explain to students that they will be asked to demonstrate on the written test actions listed in the specific objectives.
- Give the written test.

  NOTE: The written test may be given in sections if desired.

- Evaluate the students on assignment sheet activities if not previously done.
- Reteach and retest if necessary.
- Complete appropriate section of competency profiles.

- Review individual and group performance in order to evaluate teaching methods. If required, adjust scope, sequence, or instructional approaches for additional lessons as required.

SUGGESTED RESOURCES

- American Association of Meat Processors, PO Box 269, Elizabethtown, PA 17022, (717) 367-1168.
- American Lamb Council, 200 Clayton St., Denver, CO 80206, (303) 399-8130.
- American Meat Institute, PO Box 3556, Washington DC 20007, (703) 841-2400.
- American Meat Science Association, 444 N. Michigan Ave., Chicago, IL 60611, (312) 456-5520.
- American Sheep Producers Council, 200 Clayton St., Denver, CO 80206, (303) 399-8130.
- Food Marketing Institute, 1750 K St. NW, Washington DC 20006, (202) 452-8444.
- Meat Importers Council of America (MICA), 1901 N. Fort Meyer Dr., Arlington, VA 22209, (703) 522-1910.
- National Association of Meat Purveyors, 8365-B Greensboro Dr., McLean, VA 22102, (703) 827-5754.
- National Cattlemen's Association, P. O. Box 3469, Englewood, CO 80155, (303) 694-0305.
- National Association of State Departments of Agriculture, 1616 H St. NW, Washington DC 20006, (202) 628-1566.
- National Live Stock and Meat Board, 444 N. Michigan Ave., Chicago, IL 60611, (313) 467-5320 or (312) 467-5520.
- National Live Stock Producers Association, 4581 Independence St. Suite 200, Wheatridge, CO 80033, (303) 423-4792.
- National Pork Producers Council, PO Box 10383, Des Moines, IA 50306, (515) 223-2600.
- National Turkey Federation, 11319 Sunset Hills Road, Reston, VA 22090, (703) 435-7206.
- US Meat Export Federation, Cherry Creek Plaza I, Suite 1000, 600 S. Cherry St., Denver, CO 80222-1716, (303) 399-7151.

UNIT REFERENCES

- Harwell, Edward M., Herman Friedman and Sam Feig, *Meat Management and Operations*, Chain Store Publishing Corporation, New York, 1975.
- Henrickson, Robert L., *Meat, Poultry and Seafood Technology*, Animal Science Department, Oklahoma State University, Stillwater, Oklahoma.
- *National Food Review*, Vol. 12, Issue 2, April-June 1989, Economic Research Service, United States Department of Agriculture, Washington, D.C.
- *Occupational Outlook Handbook* (revised annually), U.S. Department of Labor, Superintendent of Documents, U.S. Government Printing Office, Washington, D.C.
- *Dictionary of Occupational Titles, 4th ed.*, U.S. Department of Labor, Superintendent of Documents, U.S. Government Printing Office, Washington, D.C.

INFORMATION SHEET

ORIENTATION TO MEAT AND POULTRY PROCESSING *I*

OBJECTIVE 1

Match terms associated with meat and poultry processing to their correct definitions.

- **Abattoir** (AB-uh-TWAR) — Slaughterhouse and packing house
- **Consumer** — An individual who buys goods and services for personal use rather than for resale
- **Gross profit margin** — The amount of money remaining after paying basic operating expenses
- **Labor costs** — The amount of salary or wages paid to employees as well as contributed to their benefit programs
- **Mechanization** — Using machinery to perform functions
- **Per capita** — Per person
- **Processor** — Processes the carcass, primal cuts, or raw ingredients into the finished product
- **Purveyor** — Meat middleman that buys whole carcasses or primal cuts and resells them to consumers or retail outlets without further processing
- **Retailer** — An individual or company that sells products to consumers
- **Retail sales price** — The amount of money the consumer pays for a product
- **Self-service counters** — Display counters where the consumer selects products without assistance
- **Wholesaler** — Individual or company that sells products to retailers in relatively large quantities at a price lower than the retail sales price

OBJECTIVE 2 **Select from a list true statements concerning the history of processing.**

The growth of the meat and poultry processing industry has evolved over the decades from single butcher operations to state of the art mechanization. Its development has provided consumers with safer, higher quality products due to improvements in sanitation and processing.

Meat packing plants were once seasonal operations associated with icehouses, but with the development of artificial refrigeration, meat packing became a year-round business. Many feedlots and packing plants were located in large cities such as Chicago. Refrigerated railway cars were in use by the 1880's, shipping meat across the country. Butcher shops located near fruit and vegetable markets were commonplace, and consumers made daily meat purchases.

During the early 1900's refrigerated trucks began to transport meat to general stores in smaller cities. Along with this came laws providing for federal inspection of meats shipped in interstate commerce. General stores gained popularity, providing a variety of meat, produce, dry goods, and household items. Meat departments in general stores offered individualized service since labor was relatively inexpensive. The departments stocked a limited amount of canned goods as well as fresh poultry and meat. Butchers processed what they needed and stored remaining portions wherever it was convenient. The importance of refrigeration and sanitation had not yet been fully recognized. Eventually an awareness of proper sanitation practices emerged coupled with federal regulation of packing plants. The processing industry began to acknowledge the need to provide high quality products to consumers.

By the 1940's and 50's packing plant facilities were being built closer to feedlots on farms and ranches to lower transportation costs. Mechanization and assembly lines were starting to increase productivity. Consumers were also experiencing changes as supermarket operations began offering limited self-service counters. These efforts were made to reduce labor costs while increasing the number of sales. Even though fewer employees were needed behind the counter to serve customers, labor costs were still significant. This was due to the fact that many products were cut and wrapped by hand using sealing irons or plates and cellophane. Meat departments often purchased whole carcasses although they could buy primal cuts, which were sections already cut from the carcass. A great deal of cutting continued to be carried out at the retail level.

Today, the meat processing industry is continuing to evaluate itself in an effort to increase profit margins while meeting the changing needs of consumers. Large-scale feeding operations bring livestock to market faster. Slaughtering and processing have become highly automated, efficiently run operations. Processing plants offer wholesalers increased cutting and packaging services to minimize the amount of labor needed at the retail outlet. Meat departments in supermarkets have continued to streamline their services and have come to rely heavily on self-service counters filled with processed and pre-packaged meat and poultry products. The use of preservatives has become a science which works with specialized packaging to keep products fresher and increase their shelf life. In addition to self-serve displays, service counters are still popular in many supermarkets today offering individualized cuts of meat as well as seafood and deli items.

OBJECTIVE 3 **Select from a list true statements concerning international trade.**

The United States remains the world's largest exporter of agricultural products. Beef and pork exports are largely high-quality, grain-fed cuts sold to Pacific Rim countries, such as Japan, Korea, and Taiwan.

In 1988, meats became the largest single U.S. agricultural import, surpassing coffee for the first time in 16 years. Boneless meat products comprise the majority of imported meat products. Most boneless beef comes from Australia, Argentina, or Canada. The bulk of lamb imports originate in New Zealand and Australia.

Beef cattle are also imported from Argentina and Canada. Imported cattle are low-cost, range-fed animals which can be fattened in feedlots then sent to slaughter.

OBJECTIVE 4 **Complete statements concerning trends in slaughter and processing.**

Meat packing operations have endured a period of consolidation over the last 20 years, and this trend is still continuing today. Many small packing plants are being purchased by large companies. As a result, older plants are being sold or redesigned to improve productivity through automation. This is occurring because of the limited gross profit margin within the industry.

Larger, more efficient meat packers have come to control the majority of slaughtering operations. Some large meat packers are purchasing or making lease arrangements with feeding operations. This arrangement allows the packer to control the supply of animals available for slaughter. Some small feeding operations are opposed to this practice and have suggested legislation to curb its impact based upon the belief that it contributes to lowering the market price of animals ready for slaughter. In some situations, packers and grain producers are forming joint ventures to stabilize feeding costs associated with grain fed livestock. Although meat packing companies are growing in size, slaughtering facilities are generally still located close to feedlots in states such as Nebraska, Iowa, Kansas, Oklahoma, and Texas.

NOTE: In contract hog production, a large corporation (contractor) supplies the hogs and feed while the grower supplies labor and facilities. A written contract outlines the grower's compensation. Hog contracting increased during the financial downturn in the farming industry in the early 1980's.

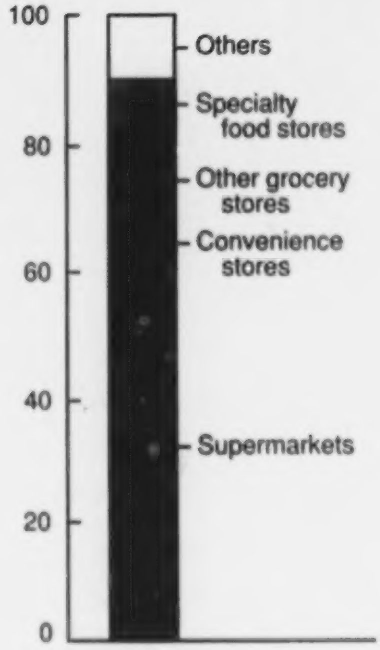
OBJECTIVE 5 **List trends apparent in retail outlets.**

Retail stores and chains have now begun purchasing their own processing facilities. For example, some chains own plants to process both meat and dairy products. Processors and retailers alike are striving for economical and efficient use of meat with little or no waste.

The meat processing industry and the products it offers are continuing to expand in the marketplace. The following trends have become apparent:

- More supermarket deli sections
- More vending machines offering prepared, packaged foods
- Increasing number of mobile catering trucks
- Rising number of food service management companies
- Increasing amounts of prepackaged foods for airlines
- More fast-food franchising

Overall, consumers still purchase the majority of food for home consumption in supermarkets as shown in the graph below.



PERCENT OF EXPENDITURES

Source: National Food Review (USDA), April-June, 1989

OBJECTIVE 6 **List trends that have appeared in response to consumer needs.**

Today's consumers are more conscious of health and nutrition than in years past. Consumers are monitoring the contents of meat and dairy products closely and are demanding that the meat industry respond with educational information, accurate product labeling, and superior products. The following are trends that have appeared recently in response to consumer needs:

- More boneless cuts of meats
- Cuts of meat containing less fat
- Meat replacements
- Fortified meats
- Non-refrigerated meats
- Portion-controlled packaging

- More frozen, fully-cooked products
- Cuts suitable for microwave preparation
- Cuts suitable for quick, convenient preparation

OBJECTIVE 7 **Select factors affecting consumer food spending.**

The amount of money consumers spend for food purchases depends upon a number of factors. These factors may include:

- **Health and dietary concerns**

  NOTE: Consumers are more health conscious than ever and the marketplace has been responding with higher quality products and increased labeling.

- **Lifestyles, fads, and trends**

  NOTE: Busier lifestyles contribute to more fast food consumption and prepared food purchases.

- **Household income**

  NOTE: Wealthier households spend more dollars per person on food and eat away from home more frequently than average households. Research has shown that when consumers' incomes rise, they generally increase the number of dollars they spend on food. This is because they tend to demand higher quality products and more convenience.

- **Ethnic background**
- **Size of household**
- **Age**

  NOTE: The age of the head of household contributes to the dollars spent on food. A head of household 35 years or younger will usually spend less per person than older heads of households.

- **Region of country**

  NOTE: Dollars spent per person also differ within the various regions of the country. In 1985, urban households in the West and Northeast spent more per person on food than households in the South. More specifically, the Western region had the highest expenditure and the Southern region the lowest.

OBJECTIVE 8

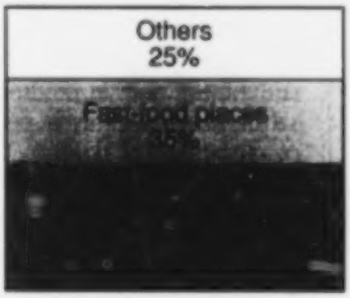
Select from a list true statements concerning reasons consumers spend more money for food purchases away from home.

Three reasons for this are:

- Consumer incomes are rising which allows them to eat out more frequently
- More women are in the work force than ever before
- Consumers are experiencing more time constraints which means there is less time to prepare foods at home

NOTE: Consumers spent 445 percent more for food in 1988 than they did in 1965. There was also a dramatic increase of 703 percent for dollars spent on food eaten away from home during this same period. More recently, in the period from 1985 to 1988, consumer spending increased 25 percent for away-from-home meals and 11 percent for at-home meals.

The following figure illustrates that the majority of dollars used on food purchases away from home were spent at restaurants and fast-food establishments.



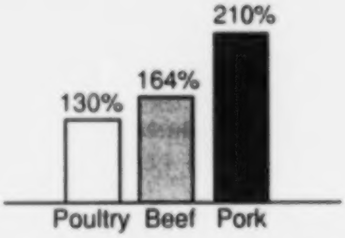
PERCENT OF DOLLARS SPENT ON FOOD EATEN AWAY FROM HOME IN 1987

Source: National Food Review (USDA), April-June, 1989

OBJECTIVE 9 **Select from a list true statements concerning food prices in the meat and poultry industry.**

Meat and poultry supplies hit record highs in 1988 due to the increase of pork and poultry production. In most cases, large supplies of a product lower its retail price. Interestingly, this did not happen. Instead, retail prices for beef and poultry increased because of strong consumer demand. The higher demand for meats was partly due to the fact that consumers had more money to spend on food because their incomes were rising.

According to the Consumer Price Index, from 1966-1988 retail prices for pork increased more than beef or poultry.



RETAIL PRICE INCREASES FROM 1966 TO 1988

Source: Consumer Price Index

Retail prices for poultry have been well below red meats because technical advances have increased production and created cost savings at farm and processing levels. There has also been a substantial gain in poultry consumption. Between 1986 and 1989, there was a 64 percent increase in per capita (per person) consumption of poultry. During this same time, red meat per capita consumption decreased by 11 percent.

OBJECTIVE 10 **List skills important in the meat cutting profession.**

A meat cutter reduces animal carcasses into cuts of meat suitable for sale to wholesalers or consumers. Some meat cutters learn their skills in trade and vocational schools, but most acquire basic training on the job or through apprenticeship programs. Apprenticeship programs generally require classroom instruction in addition to two years of supervised on-the-job training. Some programs may require a competency test at the end of the apprenticeship.

NOTE: In meat packing plants, meat cutters cut the carcasses into large wholesale cuts. In grocery stores and wholesale operations, they separate the wholesale cuts into retail cuts or individual size servings. Meat cutters in retail food stores also arrange and display meat items in refrigerated cases and prepare special cuts of meat ordered by customers.

The following skills are important in the meat cutting profession:

- Ability to use hands well (manual dexterity)
- Good eye/hand coordination
- Good depth perception
- Ability to discriminate colors
- Ample strength for lifting and moving heavy pieces of meat
- Ability to communicate clearly
- Ability to use mathematical skills

OBJECTIVE 11 **List the major categories of job classifications in the meat cutting profession.** (Supplement 1)

The livestock slaughter industry was the first to use the assembly line process. There are many specialized jobs to be performed but they can be classified into three major categories.

- Supervisors
- Slaughter personnel
- Processing personnel

OBJECTIVE 12 **Select from a list true statements concerning career opportunities in the meat cutting profession.**

- Meat cutters may progress to supervisory jobs or to quality assurance positions.
- Some supermarket chains employ meat buyers, while each individual supermarket employs its own meat department manager.
- Wholesalers often hire meat buyers. Supervisory positions in meat packing plants provide career opportunities.
- Meat cutters may also operate retail meat markets as self-employed individuals accompanied by a small support staff.
- The demand for laborers may begin to decline in upcoming years because of the increased use of mechanization. Even so, many jobs will still be available because of the need to replace experienced workers who transfer to other occupations or who leave the labor force.

NOTE: Some meat cutters belong to the United Food and Commercial Workers International Union.

JOB DESCRIPTIONS OF COMMON MEAT CUTTING POSITIONS

MAJOR CATEGORIES	POSITION	RESPONSIBILITIES
Supervisors	Abattoir	Supervises and coordinates workers engaged in slaughtering, skinning, and dressing cattle, hogs, and sheep on the killing floor of abattoir; inspects meats and regulates conveyors
	Cutting and boning	Supervises workers engaged in cutting cattle, sheep, or swine carcasses into standard cuts, removing bones and trimming excess fat from cuts; examines cuts for quality standards
	Tank house	Supervises and coordinates workers engaged in processing by-products such as tallow, hides, and cracklings; observes meters and dials to verify specified pressures and temperatures at various process stages
	Cured meats	Supervises and coordinates workers engaged in curing and smoking activities; follows formulas for pickling meats; monitors specifications for smokeroom equipment operation
	Poultry processing	Supervises and coordinates workers engaged in slaughtering, dressing, and packing poultry; inspects meats
Slaughter Personnel	Stunner (cattle, sheep, hogs)	Stuns animals prior to slaughtering
	Poultry hanger	Shackles and suspends live or slaughtered poultry from conveyor for killing, scalding, removal of feathers, or cleaning
	Poultry killer	Severs jugular vein
	Poultry dresser	Slaughters and dresses fowl

MAJOR CATEGORIES	POSITION	RESPONSIBILITIES
Slaughter Personnel (cont)	Poultry eviscerator	Slits body cavity and removes viscera (internal organs)
	Meat dresser (cattle, sheep, hogs)	Butchers livestock in a private slaughter house or on a customer's premises
	Shackler (cattle, sheep, hogs)	Chains hind legs of stunned animals to hoist or conveyor that suspends animal for slaughtering
	Sticker (cattle, sheep, hogs)	Severs jugular vein of previously stunned animals with a knife to drain blood and prepare for slaughtering
	Skinner/hide puller (cattle, sheep, hogs)	Skins sections of animals by pulling connective tissue and skin from carcass
	Shaver/dehairing machine tender (hogs)	Removes hair and matter from hog carcass
	Poultry-picking machine tender	Operates machine that scalds, removes feathers, singes, and washes slaughtered poultry
	Head trimmer (cattle, sheep, hogs)	Severs or removes parts of animal heads and skulls and trims head meat
	Head-machine feeder (hogs)	Feeds machines that automatically pull snouts or jawbones from heads and splits heads to prepare meat for further processing
	Carcass splitter (cattle, sheep, hogs)	Saws or splits slaughtered animals to reduce carcass into sections
	Animal eviscerator (cattle, sheep, hogs)	Slits body cavity and removes viscera (internal organs)

MAJOR CATEGORIES	POSITION	RESPONSIBILITIES
Slaughter Personnel (cont)	Offal separator (cattle, sheep, hogs)	Separates edible portions of animal viscera (internal organs such as heart, liver, etc.) from offal (waste parts)
	Carcass washer (cattle, sheep, hogs)	Washes blood and matter from carcass
	Shrouder (cattle)	Covers dressed animal carcass with muslin to protect meat during storage or shipment
	Hide trimmer (cattle, sheep, hogs)	Trims and cleans animal hides; may separate according to size, weight, and condition
	Gambreler (cattle, sheep, hogs)	Hangs animal carcasses on overhead rail prior to dressing
	Final-dressing (cattle, sheep, hogs)	Cuts out defective portions of dressed animal carcasses under direction of government inspector
	Meat grader (cattle, sheep, hogs)	Examines animal carcasses to determine grade in terms of sale value; attaches grade identification tag
	Cooler room worker (cattle, sheep, hogs, poultry)	Stores and prepares dressed meat for further processing or shipment; may sort cut meat; assists on loading platform
	Hide handler (cattle, sheep, hogs)	Salts and trims hides to prepare for storage and shipment
	Hide inspector (cattle, sheep, hogs)	Inspects hides and records grade of hide on tag according to condition, size, and weight

MAJOR CATEGORIES	POSITION	RESPONSIBILITIES
Processing Personnel	Skin graders (hogs)	Transfers hog-back skins from vat to grading table and separates according to size and length
	Band saw operator	Uses electrically powered band saw to cut portions of hams for smoking, curing, or packing
	Meat boner	Cuts bones from standard cuts of meat such as chucks, hams, loins, plates, rounds, and shanks to prepare meat for packing and marketing
	Poultry boner	Cuts, scrapes, and pulls meat from cooked poultry carcasses
	Turkey-roll maker	Cuts, bones, and sews parts of eviscerated turkeys together to form roll
	Skinning-machine feeder	Feeds machine that skins pork pieces such as fatbacks, jowls, hams, and bacon prior to curing
	Smoked meat preparer	Prepares meat for smoking by soaking, attaching inspection labels, and encasing in cloth bags; moves meat to smokeroom
	Smoker	Controls battery of smoke chambers in which meats such as bacon, hams, meat loaf, sausage shoulders, and wieners are cooked and cured; inspects meat
	Casing-running machine tender	Operates machine that gathers casings to facilitate stuffing of processed meats such as sausages
	Dry curer	Cures meat products such as pork, ham, bacon, or casings prior to smoking
	Meat trimmer	Trims fat, skin, tendons, tissue, and ragged edges from meat cuts, such as loins, spareribs, butts, hams, rounds, sirloins, fillets, and chops

ASSIGNMENT SHEET 1

Development of:
READING SKILLS
WRITING SKILLS
MATHEMATICS SKILLS
SCIENCE SKILLS
CREATIVE THINKING AND PROBLEM SOLVING SKILLS
SOCIAL STUDIES SKILLS

- Introduce the assignment to the students by discussing why reading, writing, math, science, creative thinking and problem solving, and social studies skills are important.
- Discuss with them the following skills which are relevant to this task:

READING SKILLS

— Interpreting forms and records

WRITING SKILLS

— Completing forms and records

— Using standard grammar, correct spelling, punctuation, and capitalization

— Stating ideas clearly

— Using complete sentences

— Using topic sentences

MATHEMATICS SKILLS

— Calculating with whole numbers

— Calculating with fractions

— Calculating with decimals

— Solving numerical expressions

— Collecting/recording data

— Solving practical problems

— Solving income/expense problems

SCIENCE SKILLS

— Investigating health issues

CREATIVE THINKING AND PROBLEM SOLVING SKILLS

- Analyzing/synthesizing information

SOCIAL STUDIES SKILLS

- Collecting/recording data

- If students have difficulty interpreting forms and records:
  - Examine the structure of the forms being used.
  - Stress the importance of learning processing terminology.
- If students have difficulty completing forms and records:
  - Examine the structure of the forms being used.
  - Discuss the importance of keeping accurate, legible records.
- If students have difficulty using good language skills, review use of complete sentences, rules of grammar, spelling, punctuation, and capitalization.
- If students have difficulty stating ideas clearly, review rules of good composition, particularly topic sentences and introductory paragraphs.
- If students have difficulty calculating with whole numbers, review basic addition, subtraction, multiplication, and division.
- If students have difficulty calculating with fractions:
  - Discuss the concept of whole numbers and fractions of numbers.
  - Have them discuss food consumption for morning as ⅓ of the daily food consumption.
- If students have difficulty calculating with decimals:
  - Review basic skills for working with decimals.
  - Remind them that the money system is a decimal system.
- If students have difficulty solving numerical expressions:
  - Review the symbols used in math.
  - Instruct them to find the key elements of the problem.

- If students have difficulty collecting/recording data:
  - Instruct them to be consistent in collecting information and to do it every day.
  - Stress the importance of accuracy in recording information.
- If students have difficulty solving practical problems:
  - Instruct them to find the key elements of the problem.
  - Present analogies to similar practical problems they deal with as students.
- If students have difficulty solving income/expense problems:
  - Explain that these are simple addition and subtraction problems.
  - Help them break down the problem into separate components or stages.
- If students have difficulty investigating health issues:
  - Have them compare their food consumption habits for the week with those of their classmates.
  - Stress the relationship between healthy foods and a healthy body.
  - Ask them to rate the potential health value of foods they consumed at home compared to the foods they ate at fast food locations.
- If students have difficulty analyzing/synthesizing information:
  - Discuss the fact that analyzing means breaking the information down into all its components for examination.
  - Discuss the fact that synthesizing means to reassemble the information in a way that makes the information clear and usable to the student.

ASSIGNMENT SHEET 1

ORIENTATION TO MEAT AND POULTRY PROCESSING

I

Name ______________________________ Score __________

OBJECTIVE 13

Analyze your food consumption habits.

DIRECTIONS

Keep a record of your food consumption habits for one week using the chart on the following page. List the following:

- The beginning and ending date.
- The name of the place where you ate (such as home, fast food restaurant, school).
- The type of food items you ate (such as beef taco, hamburger, fries, soft drink).
- The amount of money you spent on the food. Calculate the average cost of food eaten at home by determining the total cost for the entire meal. Then divide it by the number of people eating the meal so the result is a per person average.
- The total amount of money spent for the day.
- The total amount of money spent for the entire week.

NOTE: Be sure to include between-meal snacks.

After you have recorded all the information, analyze your eating habits and write a summary on the page provided. Write one paragraph about each of the following:

- Where you ate most frequently, such as at home, fast food, etc.
- The types of meat products consumed most frequently and least frequently such as beef, chicken, pork, etc.
- Where you spent the most money, such as at home or food eaten away from home.

Functional Reading Skills
- Interpret forms and records

Functional Writing Skills
- Complete forms & records

Language Skills
- Use standard grammar, correct spelling, punctuation, and capitalization
- State ideas clearly

Composition Skills
- Use complete sentences
- Use topic sentences

Food Consumption For
Week of ______________________

Name ______________

	SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
MORNING Location Food Consumed Amount Spent							
AFTERNOON Location Food Consumed Amount Spent							
EVENING Location Food Consumed Amount Spent							
TOTAL DOLLARS SPENT FOR THE DAY							

TOTAL DOLLARS SPENT DURING THE WEEK $______________

Operation and Calculation Skills

- Calculate with whole numbers
- Calculate with fractions
- Calculate with decimals
- Solve numerical expressions

Math Application Skills

- Solve ratio/proportion problems

Data Analysis and Display Skills

- Collect /record data

Functional Math Skills

- Solve practical problems
- Solve income/expense problems

Life Science Skills

- Investigate health issues (medical, ergonomic, nutrition, mental health)

Cognitive Activities Skills

- Analyze/synthesize information

Information Analysis Skills

- Collect/record data

Write a summary of your eating habits.

ASSIGNMENT SHEET 2

Development of:
WRITING SKILLS
MATHEMATICS SKILLS
CREATIVE THINKING AND PROBLEM SOLVING SKILLS
SOCIAL STUDIES SKILLS

- Introduce the assignment to the students by discussing why writing, mathematics, creative thinking and problem solving, and social studies skills are important.

- Discuss with them the following skills which are relevant to this task:

  WRITING SKILLS

  - Using standard grammar, correct spelling, punctuation, and capitalization
  - Stating ideas clearly
  - Using complete sentences

  MATHEMATICS SKILLS

  - Calculating with whole numbers
  - Calculating with decimals

  CREATIVE THINKING AND PROBLEM SOLVING SKILLS

  - Analyzing/synthesizing information
  - Drawing conclusions

  SOCIAL STUDIES SKILLS

  - Collecting/recording data
  - Analyzing consumer issues

- If students have difficulty drawing conclusions:

  - Give an example of how data are connected to produce a conclusion.

    EXAMPLE: If students watched the food store ads over a weeks time, they could draw conclusions about whether the trend is toward lower or higher prices.

- If students have difficulty analyzing consumer issues:
  - Discuss the fact that analyzing means breaking the information down into all its components for examination.
  - Have them give examples of consumer issues they are familiar with such as blue jean designs and pricing.
- For additional suggestions on teaching basic skills, refer to Instructional Supplement 1.

ASSIGNMENT SHEET 2	***ORIENTATION TO MEAT AND POULTRY PROCESSING*** ***I***

Name ______________________ Score__________

OBJECTIVE 14 **Complete a list of pricing information for meat products.**

DIRECTIONS Prepare a list of prices for the following meat products. Compare the prices per pound of at least three meat groups: beef, poultry and pork. Write a brief summary indicating which meat group was the most expensive and least expensive on a per pound basis.

MEAT PRODUCTS PRICE LIST

Meat Group	**Total Product**	**Price per Pound**	**Total Pounds**	**Total Price**
BEEF	Ground Sirloin	_____	_____	_____
	Ground Beef	_____	_____	_____
	T-bone Steak	_____	_____	_____
	Ribeye Steak	_____	_____	_____
	Top Round Roast	_____	_____	_____
POULTRY	Whole Fryer	_____	_____	_____
	Chicken Breast	_____	_____	_____
	Thighs/Legs	_____	_____	_____
	Whole Turkey	_____	_____	_____
	Turkey Ham	_____	_____	_____
PORK	Whole Ham	_____	_____	_____
	Boneless Ham	_____	_____	_____
	Pork Roast	_____	_____	_____
	Butterfly Pork Chops	_____	_____	_____
	Bacon	_____	_____	_____
	Pork Sausage	_____	_____	_____

Operation and Calculation Skills

- Calculate with whole numbers
- Calculate with decimals

Information Analysis Skills

- Collect/record data

Functional Social Studies Skills

- Analyze consumer issues

Language Skills

- Use standard grammar, correct spelling, punctuation, and capitalization
- State ideas clearly

Composition Skills

- Use complete sentences

Cognitive Activities Skills

- Analyze/synthesize information
- Draw conclusions

Write a brief summary of your findings.

ASSIGNMENT SHEET 3

Development of:
ORAL COMMUNICATION SKILLS
EMPLOYABILITY SKILLS

- Introduce the assignment to the students by discussing why oral communication and employability skills are important.

- Discuss with them the following skills which are relevant to this task:

  ORAL COMMUNICATION SKILLS

  — Applying active listening skills

  — Applying questioning techniques

  — Conducting/receiving interviews

  — Communicating with professional colleagues/associates

  EMPLOYABILITY SKILLS

  — Investigating employment prospects of a career field/occupation

  — Investigating training requirements for a career field/occupation

  — Analyzing duties/requirements/benefits of specific job

- If students have difficulty applying active listening skills:

  — Have them familiarize themselves with the terms associated with meat and poultry processing in Supplement 1.

  — Have them practice listening and then repeating the information.

  — Suggest that they be ready to listen before the speaker starts.

  — Stress the importance of focusing on the speaker.

  — Remind them that maintaining eye contact enhances listening ability.

- If students have difficulty applying questioning techniques:
  - Instruct them to be prepared and have their questions organized before the communication begins.
  - Stress the importance of accurate questioning to identify type of job opportunities available.
- If students have difficulty conducting/receiving interviews:
  - Instruct them to be prepared and have their questions organized before the communication begins.
  - Stress the importance of using good listening skills.
  - Encourage them to practice the interviewing process with classmates.
- If students have difficulty communicating with professional colleagues/associates:
  - Explain the importance of teamwork.
  - Review listening skills, questioning techniques, giving/following directions, and non-verbal communication.
- If students have difficulty investigating employment prospects or training requirements for a career field/occupation:
  - Review listening skills, questioning techniques, giving/following directions, and non-verbal communication.
  - Team them with another student with similar career field/occupation interests.
  - Discuss the potential employment prospects and training possibilities for a packing or processing facility in the area before a representative speaks to the class.
- If students have difficulty analyzing duties/requirements/benefits of a specific job:
  - Discuss the fact that analyzing means breaking the information down into all its components for examination.
  - Discuss what duties, requirements, and benefits mean.
  - Ask the students to compare skills needed for jobs they perform at home or at work.
- For additional suggestions on teaching basic skills, refer to Instructional Supplements 1 and 2.

ASSIGNMENT SHEET 3

ORIENTATION TO MEAT AND POULTRY PROCESSING

I

Name ______________________ Score __________

OBJECTIVE 15 **Analyze job opportunities in a packing or processing facility.**

DIRECTIONS Interview a representative of a local packing or processing facility during class. Obtain the information listed below regarding the type of facility, its operation, and the types of job opportunities available in the facility. Briefly describe the duties for the positions available.

1. Name of facility

____

2. Person interviewed and position within facility

____

3. Type of facility

____

4. How long the facility has been in business

____

5. Facility ownership such as family owned, corporation, etc.

____

____

6. Number of employees

____

7. Types of positions available

____

____

____

____

____

Listening Skills
- Apply active listening skills

Interactive Communication Skills
- Apply questioning techniques
- Conduct/receive interviews
- Communicate with professional colleagues/associates

Job Search/Selection Skills
- Investigate employment prospects of a career field/occupation
- Investigate training requirements for a career field/occupation
- Analyze duties/requirements/benefits of specific job

For questions 8-13, select an entry level position to research.

8. Name of entry level position

9. Type of training required for entry level position

10. Length of apprenticeship required for entry level position

11. Types of equipment required such as knives, etc.

12. Type of clothing/uniform required

13. Shift length/number of hours worked per week

14. Amount of pay for entry level position (hourly or monthly wage)

ASSIGNMENT ANSWERS	ORIENTATION TO MEAT AND POULTRY PROCESSING I
ASSIGNMENT SHEET 1	Student should have kept a record of food consumption habits for one week using the chart provided and written a summary analyzing his or her eating habits.
ASSIGNMENT SHEET 2	The student should have completed a list of prices for meat groups and written a brief summary indicating which meat group was the most expensive and least expensive on a per pound basis.
ASSIGNMENT SHEET 3	The student should have analyzed job opportunities by interviewing a representative of a local packing or processing facility during class.

WRITTEN TEST

ORIENTATION TO MEAT AND POULTRY PROCESSING

I

Name ______________________________ Score__________

OBJECTIVE 1

Match terms associated with meat and poultry processing to their correct definitions. Write the correct letters in the blanks.

_____ 1. An individual who buys goods and services for personal use rather than for resale

_____ 2. The amount of money remaining after paying basic operating expenses

_____ 3. The amount of salary or wages paid to employees as well as contributed to their benefit programs

_____ 4. Using machinery to perform functions

_____ 5. An individual or company that sells products to consumers

_____ 6. The amount of money the consumer pays for a product

_____ 7. Display counters where the consumer selects products without assistance

_____ 8. Individual or company that sells products to retailers in relatively large quantities at a price lower than the retail sales price

_____ 9. Slaughterhouse and packing house

_____ 10. Processes the carcass, primal cuts, or raw ingredients into the finished product

_____ 11. Meat middleman that buys whole carcasses or primal cuts and resells them to consumers or retail outlets with or without further processing

a. Labor costs

b. Processor

c. Net profit

d. Gross profit margin

e. Retailer

f. Retail sales price

g. Abattoir

h. Meat buyer

i. Consumer

j. Per capita

k. Overhead costs

l. Self-service counter

m. Full-service counter

n. Mechanization

o. Final cost

p. Wholesaler

q. Contractor

r. Purveyor

May be photocopied for student use.

____ 12. Per person

OBJECTIVE 2

Select from a list true statements concerning the history of processing. Write an "X" in the blank before each true statement.

____ 1. The development of meat processing has provided consumers with safer, higher quality products due to improvements in sanitation and processing.

____ 2. Artificial refrigeration was responsible for helping the meat packing industry become a year-round business.

____ 3. Even though labor was expensive, meat departments in general stores offered individualized service.

____ 4. Proper sanitation and refrigeration practices emerged along with federal regulation of packing plants.

____ 5. Self-service counters helped increase labor costs while decreasing the number of sales.

____ 6. Mechanization of the meat packing industry has helped increase productivity.

____ 7. Large-scale feeding operations bring livestock to market faster.

OBJECTIVE 3

Select from a list true statements concerning international trade. Write an "X" in the blank before each true statement.

____ 1. The United States remains the world's largest exporter of agricultural products.

____ 2. Boneless meat products comprise the majority of imported meat products.

____ 3. Imported cattle are low-cost, range-fed animals which can be fattened in feedlots then sent to slaughter.

OBJECTIVE 4

Complete statements concerning trends in slaughter and processing. Circle the word(s) that best completes each statement.

1. Meat packing operations have endured a period of **(fragmentation, consolidation)** over the last 20 years and this trend is still continuing today.

May be photocopied for student use.

2. Larger, more efficient meat packers have come to control the **(majority, minority)** of slaughtering operations.

3. Meat packers sometimes own commercial feedlots so they can **(control the supply of animals available for slaughter, lower their costs of operation).**

OBJECTIVE 5 **List trends apparent in retail outlets.** Write four trends in the space provided.

____

____

____

____

OBJECTIVE 6 **List trends that have appeared in response to consumer needs.** Write six trends in the space provided.

____

____

____

____

____

____

OBJECTIVE 7 **Select factors affecting consumer food spending.** Write an "X" in the blank before each correct answer.

____ 1. Household income

____ 2. Region of country

____ 3. Ethnic background

____ 4. Religion

____ 5. Age

____ 6. Political party

____ 7. Size of household

May be photocopied for student use.

____ 8. Sex

____ 9. Health and dietary concerns

____ 10. Lifestyles, fads, and trends

OBJECTIVE 8

Select from a list true statements concerning reasons consumers spend more money for food purchases away from home. Write and "X" in the blank before each correct answer.

____ 1. Consumer incomes are rising which allows them to eat out more frequently.

____ 2. Consumers are experiencing more time constraints which means there is less time to prepare foods at home.

____ 3. More young people are in the work force than ever before.

OBJECTIVE 9

Select from a list true statements concerning food prices in the meat and poultry industry. Write an "X" in the blank before each true statement.

____ 1. In most cases, large supplies of a product raise its retail price.

____ 2. The higher demand for meats was partly due to the fact that consumers had more money to spend on food because their incomes were rising.

____ 3. Retail prices for poultry have been well below red meats because technical advances have increased production and created cost savings at farm and processing levels.

____ 4. Meat and poultry supplies hit record lows during 1988.

May be photocopied for student use.

OBJECTIVE 10 **List skills important in the meat cutting profession.** Write four skills in the space provided.

____

____

____

____

OBJECTIVE 11 **List the major categories of job classifications in the meat cutting profession.** Write three categories in the space below.

____

____

____

OBJECTIVE 12 **Select from a list true statements concerning career opportunities in the meat cutting profession.** Write an "X" in the blank before each true statement.

____ 1. Some supermarket chains employ meat buyers, while each individual supermarket employs its own meat department manager.

____ 2. Wholesalers often hire meat buyers.

____ 3. Supervisory positions in meat packing plants provide career opportunities.

____ 4. Meat cutters may also operate retail meat markets as self-employed individuals accompanied by a small support staff.

____ 5. The demand for laborers may begin to decline in upcoming years because of the decreased use of mechanization.

NOTE: Objectives 13-15 are evaluated on job sheets/assignment sheets in this unit. If you have not completed these components, see your instructor.

May be photocopied for student use.

WRITTEN TEST ANSWERS

ORIENTATION TO MEAT AND POULTRY PROCESSING

I

OBJECTIVE 1

1. i
2. d
3. a
4. n
5. e
6. f
7. l
8. p
9. g
10. b
11. r
12. j

OBJECTIVE 2

1, 2, 4, 6, 7

OBJECTIVE 3

1, 2, 3

OBJECTIVE 4

1. consolidation
2. majority
3. control the supply of animals available for slaughter

OBJECTIVE 5

Answer should include four of the following:

- More supermarket deli sections
- More vending machines offering prepared, packaged foods
- Increasing numbers of mobile catering trucks
- Rising numbers of food service management companies
- Increasing amounts of prepackaged foods for airlines
- More fast-food franchising

OBJECTIVE 6

Answer should include six of the following:

- More boneless cuts of meats
- Cuts of meat containing less fat

- Meat replacements
- Fortified meats
- Non-refrigerated meats
- Portion-controlled packaging
- More frozen, fully-cooked products
- Cuts suitable for microwave preparation
- Cuts suitable for quick, convenient preparation

OBJECTIVE 7 1, 2, 3, 5, 7, 9, 10

OBJECTIVE 8 1, 2

OBJECTIVE 9 2, 3

OBJECTIVE 10 Answer should include four of the following:

- Ability to use hands well (manual dexterity)
- Good eye/hand coordination
- Good depth perception
- Ability to discriminate colors
- Ample strength for lifting and moving heavy pieces of meat
- Ability to communicate clearly
- Ability to use mathematical skills

OBJECTIVE 11 Supervisors, slaughter personnel, and processing personnel

OBJECTIVE 12 1, 2, 3, 4

OBJECTIVE SHEET

MAINTAIN PLANT FACILITIES

II

INTRODUCTION

As consumers of meat and poultry, most Americans feel confident of getting quality products because of federal and state inspection requirements. The meat and poultry that we serve to our families is safe and free from contamination and part of the reason for this quality is the safe and regularly inspected plant facilities.

UNIT OBJECTIVE

After completing this unit, the student will be able to identify the basic requirements necessary to maintain and operate a meat and poultry processing facility. The student will demonstrate these competencies by completing an assignment sheet and written test with a minimum of 85 percent accuracy.

SPECIFIC OBJECTIVES

After completing this unit, the student will be able to

1. Match terms associated with maintaining plant facilities to their correct definitions.
2. List factors that affect plant site selection.
3. Discuss the factors to consider in the operation of a facility.
4. Select from a list true statements regarding refrigeration requirements.
5. Select from a list objectives of the Wholesome Meat Act of 1967.
6. Select from a list responsibilities of federal meat inspectors.
7. Select from a list true statements regarding meat inspection stamps.
8. Tour a processing facility and complete a descriptive report of the facility's basic inspection requirements. (Assignment Sheet 1)

MAINTAIN PLANT FACILITIES

PREPARATION

- Obtain materials to supplement unit.

  NOTE: See Suggested Resources.

- Review instructional outline and student supplements for this unit. Modify time frames to suit class needs and plan activities for each class period.

- Study the specific objectives to determine those you will cover in your presentation. Decide which objectives should be taught to which students.

- Determine scope and sequence of objectives that you add. Design and develop support materials, including evaluation techniques, for additional objectives.

- Make arrangements for guest speakers. Supply speakers with specific objectives and other appropriate sections of the unit.

- Prepare classroom.

  - Put up posters, charts, and other items dealing with maintaining plant facilities.

  - Have articles, brochures, and other literature dealing with maintaining plant facilities available for students.

DELIVERY

Objectives 1 through 7

- Have students read and discuss Supplements 1 through 8.

- Have students collect articles on meat and poultry processing facilities and new developments within the industry.

- Tour various types of slaughtering, meat packing, and processing facilities for different types of livestock so students understand the differences in the types of facilities required.

- Invite a meat inspector or a representative from the State Department of Agriculture's Meat Inspection Division to visit the class and discuss inspection procedures and inspection stamps.

APPLICATION

Objective 8

- Use Assignment Sheet 1 to help students identify basic requirements that all meat processing facilities must meet for sanitary operations.

EVALUATION

Written Test

- Explain to students that they will be asked to demonstrate on the written test actions listed in the specific objectives.
- Give written test.

  NOTE: The written test may be given in sections if desired.
- Evaluate students on assignment sheet activities if not previously done.
- Reteach and retest if necessary.
- Complete appropriate section of competency profiles.
- Review individual and group performance in order to evaluate teaching methods. Adjust scope, sequence, or instructional approaches for additional lessons as required.

SUGGESTED RESOURCES

- Oklahoma State Department of Agriculture, Meat Inspection Division, 2800 N. Lincoln, Oklahoma City, OK 73105, (405) 521-3741.
- National Association of State Departments of Agriculture, 1616 H Street NW, Washington, DC 20006, (202) 628-1566.

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OBJECTIVE 1 **Match terms associated with maintaining plant facilities to their correct definitions.**

- **Capital** — Assets of a business, commonly considered financial assets
- **Caustic acids** — Acids that burn, eat away, or destroy
- **Disinfect** — To sterilize or destroy harmful bacteria or viruses
- **Facilities, Equipment and Sanitation Division** — The Food Safety and Inspection Service (FSIS) division responsible for reviewing and approving plans and equipment for federally-inspected meat processing plants
- **FSIS** — Food Safety and Inspection Service
- **Impervious material** — A material that liquids or water cannot penetrate
- **Inedible** — A material not fit to be eaten
- **Inedible rendering** — The delivery or handling of materials unfit for consumption
- **Microorganisms** — Microscopic animal or plant organisms such as bacteria or viruses
- **Paunch contents** — The contents of the abdomen or stomach of an animal
- **Personal hygiene** — Sanitary practices associated with personal cleanliness
- **Potable water** — Drinking water that is free of impurities
- **Structural features** — The walls, floors, roof, and other major parts of a building
- **Toxic chemicals** — Poisonous chemicals
- **Traffic flow** — The movement of persons or equipment through a facility
- **USDA** — United States Department of Agriculture

OBJECTIVE 2 **List factors that affect plant site selection.**

The success of a meat or poultry processing plant depends upon many factors working together to provide an efficient operation. The facility and equipment necessary for a small slaughter or processing plant are considerably less than those of a large operation. The type and volume of livestock processed also requires different types of facilities. Even so, the following factors apply to all operations and plant sites:

- **Sources of livestock**

  NOTE: Locate plants relatively close to feeding facilities.

- **Transportation**

  NOTE: Consider the method of transportation (trains, trucks, etc.) necessary for bringing livestock to the processing plant and shipping products from the plant.

- **Local zoning laws**

  NOTE: Zoning laws differ for cities and states; consult local authorities for regulations.

- **Water supply**

  NOTE: A good, potable water supply is essential.

- **Waste disposal facilities**

  NOTE: Waste disposal systems designed for liquid and solid waste are required.

- **Sanitation**

  NOTE: Consider the proximity of potential pollution and sanitation hazards such as sewage disposal plants or stockyards.

- **Trained work force**

  NOTE: Access to a trained or trainable labor pool is desirable.

- **Construction costs**

- **Tax incentives**

  NOTE: Some states and communities offer tax incentives, such as tax credits, for locating businesses in their area.

- **Capital resources**

  NOTE: Check state and local financial resources for availability of capital for construction and ongoing operation or expansion.

- **Current and future needs**

  NOTE: Examine the growth potential of the business and plan the facilities with growth in mind.

OBJECTIVE 3 **Discuss the factors to consider in the operation of a facility.**

Three factors should be considered in the design and layout of a facility:

- **Types of materials used for construction**

  Construction materials and equipment used in the facility should be easy to clean, resistant to wear and corrosion, and unaffected by chemicals and microorganisms.

  NOTE: Extensive cleaning and sanitation practices require the use of strong chemicals that can affect floors, walls, and equipment. The various types of materials available should be carefully studied in relation to proposed operating conditions.

- **Sanitation requirements**

  Sufficient space to clean equipment, the steps involved in cleaning, proper drainage, and employee hygiene are sanitation considerations.

- **Traffic flow**

  Optimum traffic flow reduces the amount of soil, trash, and product contamination that can enter the plant and be distributed throughout.

  NOTE: Raw material and finished product areas should be kept separate to avoid the transfer of contamination. For example, hallways should enable employees to reach hand washing facilities without entering other parts of the plant.

OBJECTIVE 4 **Select from a list true statements regarding refrigeration requirements.**

- Cold storage is the most common form of storage for meat products.
- Chilling of carcasses or cuts should take place within 24-36 hours after slaughter.
- Meat can easily spoil if chilling is delayed or if the chill temperature is not low enough.
- A storage room temperature of 50°F or lower (poultry requires 40°F) is necessary for raw meat, cooked, ready-to-eat products, or finished perishable products. These products must also be accessible for inspection.

OBJECTIVE 5 **Select from a list objectives of the Wholesome Meat Act of 1967.**

The Meat Inspection Act of 1906 established the federal meat inspection program for all meats moving in interstate or foreign trade. The act was established to ensure uniform standards and procedures for inspecting meat. The act, however, did not cover meats that were moved intrastate and consumer protection varied from state to state. The Wholesome Meat Act of 1967 was passed to bring states in line with federal inspection guidelines. The states were given three years to establish inspection guidelines that were equal to federal guidelines. If a state did not establish guidelines, inspection in that state reverted to the federal system. This was done to assure consistency throughout the country. The objectives of the Wholesale Meat Act of 1967 were to assure consumers of:

- Wholesome meat and meat products.
- Sanitary processing conditions.
- Truthful labeling of meat and meat products.

OBJECTIVE 6 **Select from a list responsibilities of federal meat inspectors.**

The United States Department of Agriculture's (USDA) Animal and Poultry Health Inspection Service is responsible for inspection of meat. There are two types of inspectors: federal and state. Their duties obligate them to carry out the inspection process from the health of the live animal until the processed product reaches the consumer.

Federal inspectors may be veterinary inspectors or lay inspectors. They are responsible for:

- Detecting diseased meat and seeing that it is destroyed.
- Monitoring clean and sanitary handling and preparation.
- Preventing the addition of harmful or improper substances.
- Preventing false labeling.
- Applying the inspection stamp.

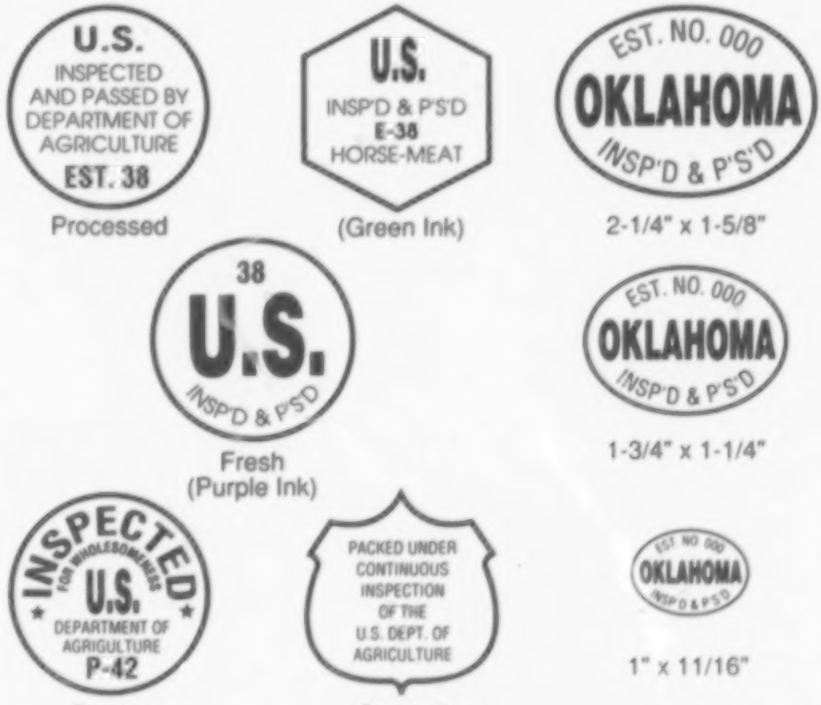
NOTE: Certification of state inspectors may be equal to that of federal inspectors. They are under the administration of the State Department of Agriculture's Meat Inspection Division.

OBJECTIVE 7 **Select from a list true statements regarding meat inspection stamps.**

Meat inspection stamps aid in the process of providing wholesome meat to consumers in the following ways:

- Federal and state approved meat processing facilities are issued an official establishment number.
- Meat inspection stamps carry the official establishment number in order to identify the origin of the product.
- Federally-inspected meat may be shipped within a state, to other states, or to other countries.
- State-inspected meat must be sold within the state.

NOTE: Edible ink is used for inspection stamps.


U.S.
INSPECTED
AND PASSED BY
DEPARTMENT OF
AGRICULTURE
EST. 38
U.S.
INSP'D & P'S'D
E-38
HORSE-MEAT
EST. NO. 000
OKLAHOMA
INSP'D & P'S'D
38
U.S.
INSP'D & P'S'D
EST. NO. 000
OKLAHOMA
INSP'D & P'S'D
INSPECTED
FOR WHOLESOMENESS
U.S.
DEPARTMENT OF
AGRICULTURE
P-42
PACKED UNDER
CONTINUOUS
INSPECTION
OF THE
U.S. DEPT. OF
AGRICULTURE
EST NO 000
OKLAHOMA
INSP'D & P'S'D

Processed

(Green Ink)

2-1/4" x 1-5/8"

Fresh
(Purple Ink)

1-3/4" x 1-1/4"

Poultry

Canned

1" x 11/16"

U. S. AND OKLAHOMA MEAT INSPECTION STAMPS

STEPS TAKEN IN APPROVING NEW FACILITIES

The Food Safety and Inspection Service (FSIS) of the United States Department of Agriculture (USDA) has a division that is responsible for developing standards for meat and poultry plants and equipment. The following steps are taken in approving new facilities:

- The Facilities, Equipment and Sanitation division must review and approve plans and blueprints of a meat or poultry facility and its equipment before it can become a federally inspected plant.

- The plans must prove that the facility is an environment that is satisfactory for inspection and handling of meat products.

- The review includes types of materials used which come in contact with food as well as structural features which affect food sanitation.

  NOTE: An existing facility which desires to make changes or additions to its plant must also be reviewed and approved.

- The USDA assigns the facility an official establishment number upon approval.

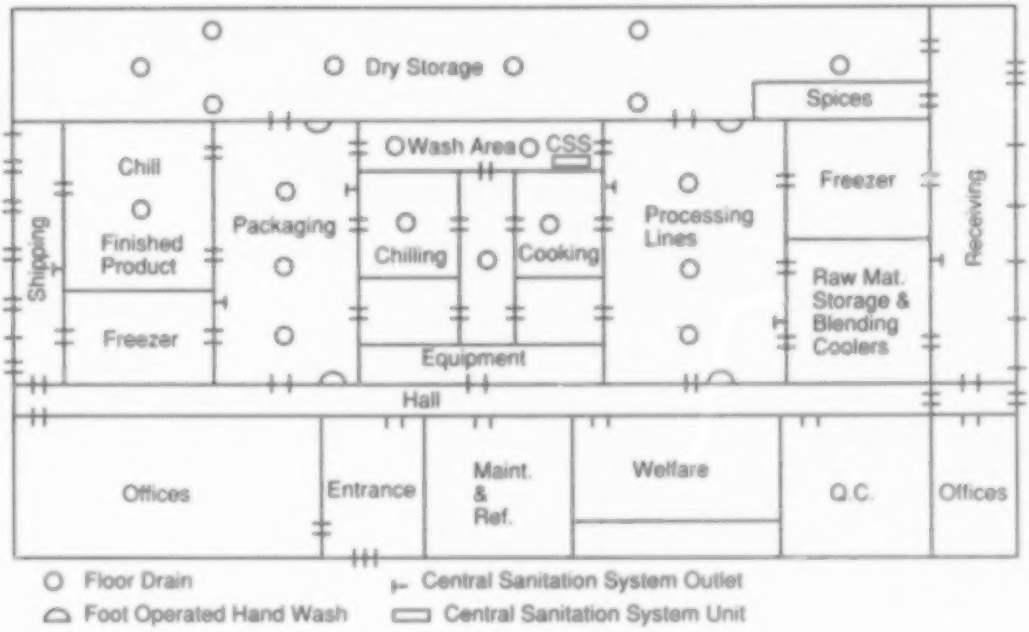
- Four types of plans and specifications must be submitted to the FSIS for approval when applying for a federally inspected plant:

  Plot plan — provides information about the location of the premises as well as surrounding buildings, railroads, water sources (i.e., rivers, streams), roads, etc.

  Floor plan — shows location of structural features including walls, doors, storage tanks, principal pieces of equipment, hose connections, work stations, rest rooms, etc.

  Plumbing plan — shows sources of water supplies, floor drainage, sewage disposal, toilet facilities, etc.

  Room schedule — describes the materials used to finish floors, walls, ceilings, etc.


Dry Storage
Spices
Chill
Finished Product
Freezer
Shipping
Packaging
Wash Area
CSS
Chilling
Cooking
Equipment
Processing Lines
Freezer
Raw Mat. Storage & Blending Coolers
Receiving
Hall
Offices
Entrance
Maint. & Ref.
Welfare
Q.C.
Offices
○ Floor Drain
⌓ Foot Operated Hand Wash
Central Sanitation System Outlet
▭ Central Sanitation System Unit

SAMPLE FLOOR PLAN

Used with permission of *Meat Processing*.

WATER REQUIREMENTS FOR SANITARY OPERATION OF FACILITIES

- An ample amount of potable water is required for operation. It should contain no impurities, should not be corrosive to the water supply system, and should be protected against contamination and pollution.

- Most municipalities supply water that is considered safe for meat processing. This water as well as water from private supplies must be tested for pollution or contaminants. Periodic testing procedures identify microorganisms or toxic chemicals that do not comply with established standards. The water supply, storage facilities, and distribution system are all tested.

- Non-potable water is also available for fire protection, refrigeration systems, or inedible rendering. It should be clearly identified and be kept separate from the potable water.

- Water temperatures of 180°F are to be furnished for disinfecting equipment, floors, and walls where diseased carcasses and viscera may be handled. Ordinarily water of 140°F is adequate for cleaning rooms and equipment; this temperature is hot enough to wash away fat, blood, and meat juices.

DRAINAGE AND WATER DISPOSAL REQUIREMENTS FOR SANITARY OPERATION OF FACILITIES

- **Drainage**
    - The number, location, and size of drain outlets depends on the type and volume of the operation, but are generally required on a drain-to-square-footage ratio.
    - Drains should be located close to equipment that requires large volumes of water for cleaning or operation.
    - Drains should be located in areas such as processing lines, packaging, chilling, and cooking areas, etc.
    - The type and size of drains and sewage lines may have to meet state and local code requirements as well as federal regulations.
- **Waste disposal**
    - Sewage and waste materials such as manure, paunch contents, trash, garbage, and paper must have adequate disposal systems.
    - Waste disposal systems should prevent the development of odors and should not harbor rodents or insects.
    - Local and state health departments may have specific waste disposal requirements.
    - Blood cannot usually be disposed of in municipal sewer lines or septic systems; it is often hauled away by rendering companies.

FLOOR AND WALL COVERING REQUIREMENTS FOR SANITARY OPERATION OF FACILITIES

- **Floor coverings** — The sanitation and durability of a floor are two prime considerations in a meat processing facility. A great deal of discarded material falls to the floor during processing requiring it to be cleaned and disinfected daily with strong chemicals such as cleansers and bleaches. Floors also must endure steam, caustic acids, the stress of machinery, workers, and hand trucks. Floors and floor coverings should be free of cracks, depressions, and separations. Slightly abrasive floors are more desirable than smooth floors to prevent slipping in wet conditions.

  Flooring material must be watertight, durable, and easy to clean. Concrete, tile, brick, or other waterproof materials should be used where wet operations such as slaughtering or curing take place. Wood floors are not recommended.

  NOTE: Brick/membrane, direct bond, and monolithic floors are new types of flooring which can withstand adverse conditions. Brick/membrane is the most chemically resistant and can bridge cracks, resist high temperatures, handle wet conditions, and withstand mechanical abuse. Direct bond is similar to brick/membrane and offers good acid protection. It is also recommended for frequent splash and spill conditions, but not areas constantly immersed in water. Monolithics are single layers or coatings which are thinner than brick or tile floors. They adhere to concrete well and provide a relatively thick barrier against liquids.

- **Wall coverings** — Light colored wall surfaces which can be easily cleaned are best. A smooth, flat, impervious material such as brick, tile, or plaster is satisfactory for interior walls. Wood, plasterboard or porous acoustical board should be avoided because of cleaning difficulties.

  NOTE: Ceiling materials should not chip, peel, deteriorate, or retain dust or condensation.

LIGHTING, VENTILATION, AND UTILITY REQUIREMENTS FOR SANITARY OPERATION OF FACILITIES

- **Lighting** — Direct natural sunlight or artificial light is necessary for optimum working conditions and proper inspection procedures.

  NOTE: When inspection procedures take place, standards are set and measured with a light meter.

- **Ventilation** — Ventilation systems such as air conditioning and/or fan-and-duct systems are common in most facilities. Improper air flow in a plant can contaminate meat and must be considered an important factor in the operation of the plant. Proper air filtering and positive air pressure must be maintained.

- **Utilities** — Most plants find the installation of three-phase electrical wiring the most efficient for operating equipment. Plants may utilize electrical power or natural gas.

  NOTE: Plants located in rural areas may find the use of natural gas more desirable and less expensive than propane.

EMPLOYEE WELFARE REQUIREMENTS FOR A FACILITY

- Employees must have dressing rooms, lockers, and lavatory facilities which are separate from food handling or processing areas.
- Foot-operated hand washing lavatories with proper soaps must be accessible for proper sanitation in areas such as kill floors.

NOTE: Personal hygiene should become a routine part of the employee's role in overall plant sanitation. Employees should be encouraged to wash their hands several times during their shift.

METHODS OF INSECT AND RODENT CONTROL

Although it is impossible to completely eliminate pests from a facility, pest control measures can be taken to keep them to a minimum. Rodents (mice, rats, etc.) and insects (flies, roaches, etc.) carry diseases which can be easily transmitted to food products. Physical barriers such as screening and tight fitting doors and windows help prevent entry. Approved chemicals may also be used in specific areas. Appropriate waste storage and disposal assists in pest control.

EQUIPMENT REQUIREMENTS FOR SANITARY OPERATION OF FACILITIES

The following are requirements for sanitation:

- Meat processing equipment should be easy to clean, free of cracks which might trap food particles, and resistant to corrosion and wear.
- The surfaces of equipment that come into contact with meat or fluids should be accessible for inspection.
- Stainless steel and approved types of plastic are acceptable materials for equipment.

  NOTE: Meat may not come in contact with copper, cadmium, lead, painted surfaces, or porcelain containers.

- The use of wooden equipment is limited in meat processing plants.

  NOTE: In dry curing, wood may be acceptable for racks, pallets, closets, or storage of packaged products in freezers. Wooden storage units should be free of nails, cracks, splinters, and knots.

- Equipment and solutions should also be provided to clean and disinfect utensils used for preparing and handling any edible product or ingredient.
- Water-dip tanks (180°F), commonly called sterilizers, or other suitable means are required for disinfecting implements that may come in contact with diseased carcasses.
- The USDA recommends that the lowest part of meat hanging from a rail be at least 12 inches from the floor to protect the meat from contamination.

ASSIGNMENT SHEET 1

Development of:
WRITING SKILLS
ORAL COMMUNICATION SKILLS
INTERPERSONAL OR RELATING SKILLS

- Introduce the assignment to the students by discussing why writing and oral communication skills are important.

- Discuss with them the following skills which are relevant to this task:

  WRITING SKILLS

  - Using standard grammar, correct spelling, punctuation, and capitalization
  - Stating ideas clearly
  - Using complete sentences
  - Taking notes

  ORAL COMMUNICATION SKILLS

  - Presenting appropriate appearance
  - Applying active listening skills
  - Applying questioning techniques
  - Conducting/receiving interviews
  - Communicating with professional colleagues/associates

  INTERPERSONAL OR RELATING SKILLS

  - Interacting with professional colleagues/associates

- If students have difficulty using good language skills, review use of complete sentences, rules of grammar, spelling, punctuation, and capitalization.

- If students have difficulty stating ideas clearly, review rules of good composition.

- If students have difficulty taking notes:
  - Review the information noting the key words and ideas.
  - Instruct them to use simple concise words.
  - Discuss the use of abbreviations for commonly used terms or phrases.
  - Stress the importance of outline techniques.
  - Stress the importance of accuracy in recording information.
  - Ask them to study the notes of classmates to find their own strengths and weaknesses in recording information.
- If students have difficulty presenting an appropriate appearance:
  - Discuss the importance of appropriate clothing in a working environment.
  - Explain the importance of making a positive impression when being considered for employment.
  - Make sure the students know the type of clothing that is expected in different situations such as interviewing or working.
  - Discuss body language and good posture.
- If students have difficulty applying active listening skills:
  - Have them familiarize themselves with the terms associated with meat and poultry inspection in Supplement 1, and water requirements for facilities in Supplement 2.
  - Have them practice listening and then repeating the information.
  - Suggest that they be ready to listen before beginning the communication.
  - Stress the importance of focusing on the speaker.
  - Remind them that maintaining eye contact enhances listening ability.

- If students have difficulty applying questioning techniques:
    - Instruct them to be prepared and have their questions organized before the communication begins.
    - Stress the importance of accurate questioning to identify type of job opportunities available.
- If students have difficulty conducting/receiving interviews:
    - Instruct them to be prepared and have their questions organized before the communication begins.
    - Stress the importance of using good listening skills.
    - Encourage them to practice the interviewing process with classmates.
- If students have difficulty communicating with professional colleagues/associates:
    - Explain the importance of teamwork.
    - Review listening skills, questioning techniques, giving/following directions, and non-verbal communication skills.
- If students have difficulty interacting with professional colleagues/associates:
    - Explain the importance of teamwork.
    - Review listening skills, questioning techniques, giving/following directions, and non-verbal communication skills.
    - Stress to them that professionals benefit in the exchange from their enthusiasm and by gaining input on the latest techniques and information.
    - Discuss the fact that experience in a profession will bring them the confidence they see professionals exhibit.

Name ____________________ Score __________

OBJECTIVE 8

Tour a processing facility and complete a descriptive report of the facility's basic inspection requirements.

DIRECTIONS

Language Skills
- Use standard grammar, correct spelling, punctuation, and capitalization
- State ideas clearly

Composition Skills
- Use complete sentences

Research Skills
- Take notes

Oral Presentation Skills
- Present appropriate appearance

Listening Skills
- Apply active listening skills

Interactive Communication Skills
- Apply questioning techniques
- Conduct/receive interviews
- Communicate with professional colleagues/associates

General Relating Skills
- Interact with professional colleagues/associates

Tour a local state-approved or federally-approved meat or poultry processing facility. Interview the plant manager or individual responsible for meeting inspection requirements for the facility. Provide answers to the following statements after inspecting the facilities for the basic requirements discussed in Objective 2 and Supplements 1 through 8.

1. Describe the area or conditions surrounding the plant that makes it a suitable or unsuitable location (i.e., located close to a potential pollution problem, near major highway, near metropolitan area, etc.).

____

____

____

____

2. Describe the source of livestock used for the products processed in the plant.

____

____

3. What type of transportation is used to ship products from the processing plant?

____

4. List the source of the potable water and how frequently it is tested.

____

____

5. List the plant areas containing floor drains; then describe the activity or operation that takes place in each area.

6. List the type of floor coverings used in three areas of the plant. Describe the activity or operation that takes place in each area and why that floor covering is appropriate.

7. List two pieces of equipment in the plant that require the use of three-phase electrical wiring.

8. Describe three employee welfare requirements located in the plant which are necessary for personal hygiene and sanitation (i.e., lockers, hand washing areas, etc.).

9. Describe two methods used to control rodents and insects in the plant.

10. Describe the materials used for the surfaces of two types of equipment and why these materials are appropriate.

11. Describe a disinfecting method used in the plant.

12. List the name and location of the facility and its official establishment number (as found on the inspection stamp).

ASSIGNMENT SHEET 1

Student should have toured a local state-approved or federally-approved meat or poultry processing facility. All questions should be answered completely, clearly, and legibly.

WRITTEN TEST

MAINTAIN PLANT FACILITIES

II

Name ____________________ Score __________

OBJECTIVE 1

Match terms associated with maintaining plant facilities to their correct definitions. Write the correct letters in the blanks.

Part I

___ 1. Drinking water that is free of impurities

___ 2. Assets of a business, commonly considered financial assets

___ 3. Food Safety and Inspection Service

___ 4. United States Department of Agriculture

___ 5. The FSIS division responsible for reviewing and approving plans and equipment for federally-inspected meat processing plants

___ 6. The walls, floors, roof, and other major parts of a building

___ 7. Sanitary practices associated with personal cleanliness

___ 8. The movement of persons or equipment through a facility

a. Financial records

b. USDA

c. Personal hygiene

d. Personal welfare

e. Capital

f. FSIS

g. Building codes

h. Structural features

i. Traffic flow

j. Potable water

k. Facilities, Equipment and Sanitation Division

l. Zoning

Part II

___ 1. Microscopic animal or plant organisms such as bacteria or viruses

___ 2. Poisonous chemicals

___ 3. A material not fit to be eaten

a. Paunch contents

b. Caustic acids

c. Alkaline

d. Microorganisms

May be photocopied for student use.

___ 4. The delivery or handling of materials unfit for consumption

___ 5. The contents of the abdomen or stomach of an animal

___ 6. Acids that burn, eat away, or destroy

___ 7. A material that liquids or water cannot penetrate

___ 8. To sterilize or destroy harmful bacteria or viruses

e. Inedible rendering
f. Toxic chemicals
g. Inedible
h. Indelible
i. Digestion
j. Impervious material
k. Barrier
l. Disinfect

OBJECTIVE 2 **List factors that affect plant site selection.** Write six factors in the space provided.

OBJECTIVE 3 **Discuss the factors to consider in the operation of a facility.** Briefly describe the three factors to consider in the operation of the facility.

May be photocopied for student use.

OBJECTIVE 4

Select from a list true statements regarding refrigeration requirements. Write an "X" in the blank before each correct answer.

___ 1. Cold storage is the most common form of storage for meat products.

___ 2. Chilling of carcasses or cuts should take place within 48-72 hours after slaughter.

___ 3. Meat can easily spoil if chilling is delayed or if the chill temperature is not low enough.

___ 4. A storage room temperature of 50°F or lower (poultry requires 40°F) is necessary for raw meat, cooked, ready-to-eat products, or finished perishable products.

OBJECTIVE 5

Select from a list objectives of the Wholesome Meat Act of 1967. Write an "X" in the blank before each objective.

_____ 1. Lower wholesale prices

_____ 2. Sanitary processing conditions

_____ 3. Lower retail prices

_____ 4. Truthful labeling of meat and meat products

_____ 5. Wholesome meat and meat products

_____ 6. Reduced level of chemicals and preservatives

OBJECTIVE 6

Select from a list responsibilities of federal meat inspectors. Write an "X" in the blank before each responsibility.

_____ 1. Preventing false labeling

_____ 2. Removing harmful or improper substances

_____ 3. Monitoring the amount of fat in a product

_____ 4. Applying the inspection stamp

_____ 5. Detecting diseased meat and seeing that it is destroyed

_____ 6. Preventing the addition of harmful or improper substances

May be photocopied for student use.

____ 7. Prosecuting violations of USDA regulations

____ 8. Monitoring clean and sanitary handling and preparation

OBJECTIVE 7

Select from a list true statements regarding meat inspection stamps. Write an "X" in the blank before each correct answer.

___ 1. Federally-approved meat processing facilities are issued an official establishment number.

___ 2. State-approved meat processing facilities are not required to have an official establishment number.

___ 3. Meat inspection stamps carry the official establishment number in order to identify the origin of the product.

___ 4. Federally-inspected meat may be shipped within a state, to other states, or to other countries.

___ 5. State-inspected meat may be sold across state lines.

NOTE: Objective 8 is evaluated on job sheets/assignment sheets in this unit. If you have not completed these components, see your instructor.

May be photocopied for student use.

WRITTEN TEST ANSWERS

MAINTAIN PLANT FACILITIES — II

OBJECTIVE 1

Part I	Part II
1. j	1. d
2. e	2. f
3. f	3. g
4. b	4. e
5. k	5. a
6. h	6. b
7. c	7. j
8. i	8. l

OBJECTIVE 2

Answer should include six of the following:

- Sources of livestock
- Transportation
- Local zoning laws
- Water supply
- Waste disposal facilities
- Sanitation
- Trained work force
- Construction costs
- Tax incentives
- Capital resources
- Current and future needs

OBJECTIVE 3

Discussion should include the following:

- Types of materials used for construction

  Construction materials and equipment used in the facility should be easy to clean, resistant to wear and corrosion, and unaffected by chemicals and microorganisms.

- Sanitation requirements

  Sufficient space to clean equipment, the steps involved in cleaning, proper drainage, and employee hygiene are sanitation considerations.

- Traffic flow

  Optimum traffic flow reduces the amount of soil, trash, and product contamination that can enter the plant and be distributed throughout.

OBJECTIVE 4 1, 3, 4

OBJECTIVE 5 2, 4, 5

OBJECTIVE 6 1, 4, 5, 6, 8

OBJECTIVE 7 1, 3, 4

OBJECTIVE SHEET

EQUIPMENT AND EQUIPMENT MAINTENANCE

III

INTRODUCTION

Safety in the meat cutting work place is the responsibility of each worker. To ensure safety, workers must have both a knowledge of the correct use of meat cutting equipment and an understanding of safety practices.

UNIT OBJECTIVE

After completing this unit, the student will be able to identify the basic equipment used in meat and poultry processing and methods of maintaining the equipment. The student will demonstrate these competencies by completing the job sheets and written test with a minimum of 85 percent accuracy.

SPECIFIC OBJECTIVES

After completing this unit, the student will be able to

1. Match the terms associated with equipment and equipment maintenance to their correct definitions.
2. Select from a list true statements about safety in meat cutting and meat processing.
3. Match protective clothing to their intended uses.
4. Select from a list true statements regarding types of meat cutting equipment.
5. State the uses of power tools in processing meats.
6. Select from a list true statements regarding safety rules for power tools.
7. Describe cutting tools and their uses.
8. Match illustrations of knives with their intended uses.
9. Label the parts of a knife.
10. Select from a list true statements regarding characteristics of knife handles.
11. Match the characteristics of a knife blade to the their correct descriptions.
12. Arrange in order the steps for sharpening knives.
13. Select from a list true statements regarding knife storage and maintenance.

14. Select from a list of true statements regarding the safe use of hand tools.

15. Maintain a band saw. (Job Sheet 1)

16. Hone a knife blade. (Job Sheet 2)

17. Steel a knife blade. (Job Sheet 3)

SUGGESTED ACTIVITIES

EQUIPMENT AND EQUIPMENT MAINTENANCE *III*

PREPARATION

- Obtain materials to supplement unit.

  NOTE: See Suggested Resources.

- Review instructional outline for this unit. Modify time frames to suit class needs and plan activities for each class period.
- Study specific objectives to determine those you will cover in your presentation. Decide which objectives should be taught to which students.
- Determine scope and sequence of objectives that you add. Design and develop support materials, including evaluation techniques, for additional objectives.
- Determine how you will schedule time for students to demonstrate competence in the required procedures.
- Make arrangements for guest speakers. Supply speakers with specific objectives and other appropriate sections of the unit.
- Arrange to have access to a band saw, various knives, a steel, and carborundum or triton hones for job sheets.
- Prepare classroom
  - Put up posters, charts, and other items dealing with equipment and maintenance.
  - Have articles, brochures, and other literature dealing with equipment and maintenance.

DELIVERY

Objectives 1 through 14

- Tour various types of slaughtering, meat packing, and processing facilities for different types of livestock and observe the safety practices in various operations and activities.
- Have students observe equipment maintenance techniques in various processing facilities.
- Have students practice maintaining various pieces of equipment.

- Prepare a display of various types of knives and discuss their uses.
- Invite a meat cutter to class to demonstrate appropriate knife sharpening techniques.
- Have students practice sharpening knives.

APPLICATION

Objective 15

- Use Job Sheet 1 to help students learn proper band saw maintenance techniques.

Objectives 16 and 17

- Use Job Sheets 2 and 3 to acquaint students with proper knife sharpening techniques.

EVALUATION

Practical Test

- Explain to students that they will be asked to demonstrate procedures on the job sheets to complete the practical test.
- Describe the rating scale used on the practical test.
- Give practical test.
- Reteach and retest as necessary.

Written Test

- Explain to students that they will be asked to demonstrate on the written test actions listed in the specific objectives.
- Give written test.

  NOTE: The written test may be given in sections if desired.
- Evaluate students on assignment sheet activities if not previously done.
- Reteach and retest if necessary.
- Complete appropriate section of competency profiles.
- Review individual and group performance in order to evaluate teaching methods. Adjust scope, sequence or instructional approaches for additional lessons as required.

SUGGESTED RESOURCES

- *Safety On The Job*, Curriculum and Instructional Materials Center, Oklahoma Department of Vocational and Technical Education, 1500 W. Seventh Ave., Stillwater, OK 74074.

UNIT REFERENCES

- Ellis, Merle, *Cutting Up In The Kitchen*, Chronicle Books, San Francisco, California, 1975.
- Fabbricante, Thomas and William J. Sultan, *Practical Meat Cutting and Merchandising*, Volume 1, Beef, 3rd ed., Van Nostrand Reinhold Co., New York, New York, 1987.
- Henrickson, Robert L., *Meat, Poultry, and Seafood Technology*, Animal Science Department, Oklahoma State University, Stillwater, Oklahoma.

OBJECTIVE 1

Match the terms associated with equipment and equipment maintenance to their correct definitions.

- **Bevel** — The sloped or angled surface of a knife blade
- **Ergonomics** — The study of the work environment and its relationship to the worker's health
- **Grinding** — Placing an angle (bevel) and degree of fineness on the edge of a knife blade
- **Honing** — Commonly called sharpening; maintaining the fineness of the edge of a knife blade
- **Repetitive trauma** — Wear and tear on the tendons, nerves, and tissues in the joints caused by highly repetitive work

  NOTE: Tendinitis (irritated and inflamed tendons) can occur in the hands, arms, or shoulders by repeating a motion frequently or using forceful movements. Carpal tunnel syndrome is a painful condition which can occur in the wrist. It is a compression of a major nerve in the wrist caused by a lot of hand repetition. Using a knife handle that is too small and digs into the palm of the hand can cause this condition. Injuries associated with wrist and arm motions are common in the meat packing industry. Equipment manufacturers are continuing to improve products to improve safety conditions and avoid injuries. For example, the blade and handle designs of knives have been changed so less energy force is required during their use.

- **Retailer** — Individual or company that sells meat and meat products individually or in small quantities directly to consumers
- **Steeling** — Smoothing the honed edge of a knife blade to produce a razor sharp condition
- **Wholesaler** — Individual or company that sells meat and meat products to retailers in relatively large quantities at a price lower than the retail sales price

OBJECTIVE 2 **Select from a list true statements about safety in meat cutting and meat processing.**

Safe work habits are expected in all aspects of the meat cutting and meat processing industry. A knowledgeable meat cutter who is at ease with the tools of the trade finds safe work habits a natural part of the job. These habits also reflect the meat cutter's professionalism and desire to be efficient and productive.

Most accidents can be avoided by being conscious of the proper way to use tools and equipment. A lack of concentration or carelessness can quickly cause an injury to you or a coworker. Power equipment operating at high speeds might seem the most likely source of accidents, but a knife carelessly concealed under a piece of meat can be just as hazardous. The meat cutter should always be aware of the importance of personal safety as well as the safety of coworkers.

The proper selection of tools and equipment required to process various cuts of meat involves safety. Using equipment improperly or selecting the wrong tool for a job can lead to injury. To avoid accidents, it is important for you to be familiar with equipment and its intended use.

The Occupational Safety and Health Administration (OSHA) administers federal legislation designed to insure safe and sanitary working conditions for employees. Your employer is required to comply with these regulations for your safety.

Safe work habits and safety procedures are the responsibility of both the meat cutter and his or her employer. If a new piece of equipment is introduced in the work place, you should learn the safety measures involved with using the equipment. In addition, if you change jobs you should become familiar with appropriate safety practices involved in the new job. Ask your employer or supervisor for safety instructions before using the equipment. **DON'T LET AN ACCIDENT SERVE AS YOUR INSTRUCTOR!**

BASIC SAFETY RULES

1. Keep floors dry, clean, and free from fat to decrease the chance of slipping and falling.
2. Look where you walk. Grease can easily be tracked onto floors, stairways, and ramps causing invisible slippery areas.
3. Stand to the side when opening and closing doors to avoid hitting others or being hit.
4. Avoid blocking hallways or aisles with carts or hand trucks.
5. Turn on lights and use adequate lighting in dark areas.

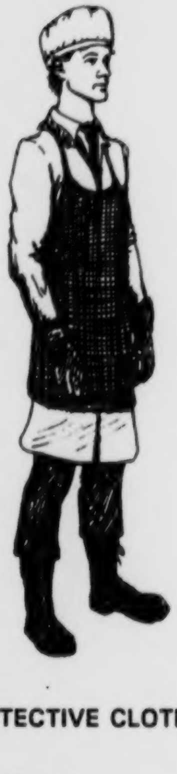
6. Know the location of fire exits and fire extinguishers.
7. Tell coworkers what you need before reaching in front of them in the work area so the person won't accidentally injure you with a sharp knife or tool.
8. Never use defective tools or equipment. Report defective or broken equipment to your supervisor.

   WARNING: DO NOT OPERATE EQUIPMENT FROM WHICH GUARDS HAVE BEEN REMOVED.

9. Turn off the power supply and unplug equipment before cleaning to prevent shock, burn, or other injury.
10. Report all accidents to your supervisor immediately, no matter how large or small. Even the smallest cuts and scratches can lead to infections.

OBJECTIVE 3 **Match protective clothing to their intended uses.**

Meat cutters use a variety of protective clothing to guard against injury. Protective clothing may include gloves, cuffs or gauntlets, stomach protectors, hard hats, and steel toe footwear. Meat cutters are also required to wear clean uniforms to maintain sanitary conditions.



PROTECTIVE CLOTHING

- **Steel-mesh gloves** — The primary reason for wearing gloves is to reduce the risk of cuts and scrapes involved in the regular use of knives. Gloves are intended to protect the wrist and fingers. Although metal mesh gloves have been used in the past, new gloves have been developed which combine fibers and stainless steel in a more comfortable glove. These gloves take the shape of the hand and are insulated for warmth.
- **Ear plugs** — Protect your hearing from loud machinery noises by wearing ear plugs. Repeated exposure to loud noises without ear protection can cause hearing loss.
- **Cuffs** — Wearing plastic cuffs or gauntlets will protect your wrists and forearms. Leather cuffs are available but are not as sanitary as plastic since washing may not completely destroy bacteria in small nicks which can occur in the cuff.
- **Stomach protectors** — Shield your abdomen from knife injuries by wearing a stomach protector. These come in a variety of materials. Meat cutters working at a bench may also use safety clothing to protect the groin and thigh areas.
- **Hard hats** — Rigid plastic hard hats protect the head and prevent hair from falling on food. USDA inspected meat plants require all meat cutters to wear these plastic helmets.
- **Steel toe footwear** — Steel toe safety boots or shoes protect your feet from falling knives or heavy weights. Often made of heavy leather, these shoes should have non-skid soles to avoid slipping in areas that may have water or waste on the floor.

NOTE: Wear safety glasses or goggles during boning and splitting procedures to avoid eye injury caused by flying bone fragments.

OBJECTIVE 4

Select from a list true statements regarding types of meat cutting equipment.

Meat cutting operations involve a variety of equipment that can generally be classified as power tools and hand tools. Power tools, operated by electricity and/or small motors, may include circular saws, band saws, meat grinders, and slicers. Power tools are used for efficient cutting and grinding operations. Major types of hand tools include knives, handsaws, cleavers, and steels used to sharpen knives.

The size of the processing plant often determines how sophisticated the tools and equipment will be. Both large and small plants may use the same type of equipment but models may vary to suit the particular need or size of operation.

OBJECTIVE 5 **State the use of power tools in processing meats.**

Wholesalers and retailers use similar types of power tools to process meats. The size of cut desired is the main difference in how they use the tools. Wholesalers prepare large cuts of meat which require multipurpose break-up saws and band saws. Since retailers process smaller portions for direct consumer purchases, they generally use power band saws. Portable circular saws, band saws (power saws), grinders, and slicers are the four basic power tools.

- **Portable circular saws** — Use circular saws to split and quarter carcasses. Keep the equipment high above your head on its retractable power lines. The rotating circular blade fits into the saw in the same fashion as an electric drill and bit. Be very cautious of the blade since it is only partially protected.
- **Band saws (power saws)** — Use band saws for cutting through bones and muscles. The circulating saw blade, operated by two pulley wheels, rotates at a very high speed to provide a clean cut. Be aware of how to adjust and maintain this power tool for safe and efficient operation.
- **Meat grinders** — Use meat grinders to produce ground meat from meat muscle. Operate a meat grinder with care. Place the meat on a feed tray and push the meat into the grinding chute with a scoop, fork, or plunger.
- **Slicers** — Slicing machines are used to prepare slices of boneless meat. The pusher plate is provided to keep fingers from contacting the rapidly rotating blade. It also puts even pressure on the meat being sliced. The razor sharp blade can easily cut your hand or fingers so do not remove scraps from the blade even if the power is turned off.

OBJECTIVE 6 **Select from a list true statements regarding safety rules for power tools.**

- Avoid wearing loose clothing that can become entangled or caught in power tools.
- Avoid talking and keep your eyes on your work when using power tools. Distractions can break your concentration and cause an accident.
- Start power tools only after checking to see if others are away or clear of the machine.
- Keep hands and fingers out of the cutting path.

- Guide the meat to allow the cutting blades to do the work. Forcing meat into the blades or applying additional pressure can cause you to slip and be cut by the blades. Blades can snap from too much pressure.

  NOTE: Use the right blade for the job.

- Before returning a moveable carriage to the original position, carefully clear the meat from the path of the band saw blade. If this is not done, the meat can strike the back blade and cause it to jump off track.

- Never walk away from a piece of equipment that is still running. Always shut the power off and see that the machine is fully stopped before leaving.

- Shut the power off and unplug equipment before cleaning or adjusting.

- Turn off the master control power switch for all equipment when the machines will not be used for an extended period of time (i.e., overnight).

- Use the safety features built into equipment. Disabling or removing safety features puts you and your coworkers in danger.

- Receive proper instruction on the appropriate use of equipment BEFORE using it. **Personal safety is your responsibility!**

OBJECTIVE 7 **Describe cutting tools and their uses.**

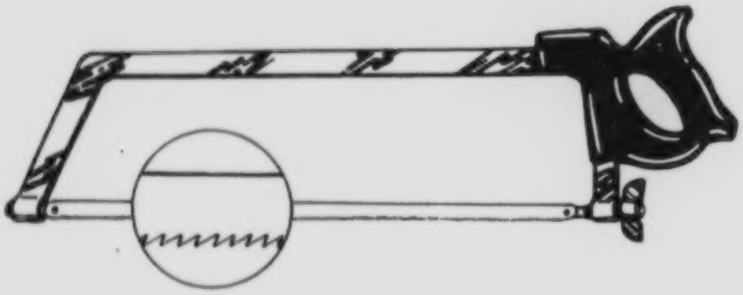
- **Knives** — Knives are one of the meat cutters most important hand tools. Knives are used for boning, cutting large parts, sticking, or carving.

  NOTE: Never use a knife as a screwdriver or pry bar.

- **Handsaws** — Handsaws are hand tools used to cut through bones of large cuts of meat. Use a small handsaw for preparing smaller cuts such as chops. Large handsaws are best used to cut steaks or halve a carcass through a backbone.

  As with power tools, guide the saw and let the blade do the work. Applying too much pressure can cause the blade to jump or bend and injure the free hand.

  NOTE: Small retailers and food service providers in institutions and hotels still use handsaws. Power tools are fast replacing handsaws.



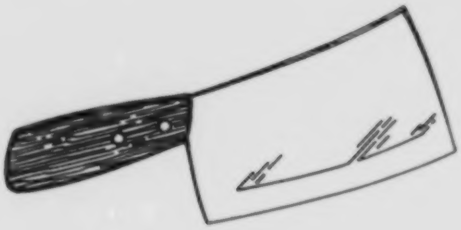
HANDSAW

NOTE: The teeth of the blade should point forward when the blade is properly inserted.

- **Cleavers** — Cleavers are larger and heavier than knives, making them especially useful for cutting the backbones of carcasses and for preparing various types of chops.

  Cleavers may be purchased in many shapes, sizes, and weights.

  Control the cutting action of the cleaver by placing your thumb on the back portion of the blade. A cleaver can quickly sever a finger or hand, so **KEEP HANDS AND FINGERS OUT OF THE CUTTING PATH!** The cleaver should never be used as a mallet or hammer.



CLEAVER

OBJECTIVE 8

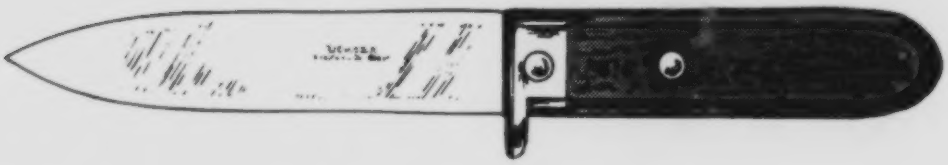
Match illustrations of knives with their intended uses.

Just as a carpenter uses his or her own tools to produce fine quality workmanship, a meat cutter has his or her own set of knives. If expertly handled and well cared for, a good set of knives can last many years. As a meat cutter, you may own your knives. You will become accustomed to their "feel" as you learn to master your trade. You may store them in a personal tool box kept in a private locker. Some retail stores provide knives for their employees and store them so they are accessible to all employees. In these circumstances, "community" knives are generally not maintained as well as personal knives. It tends to lower efficiency and productivity and can cause accidents when knives are not maintained. You may wish to consider the benefits of owning and caring for a personal set of knives.

Knives are available in a variety of sizes and qualities. Each knife is designed for a specific purpose and you should know how to use each one the most efficiently.

KNIFE SELECTION AND USE

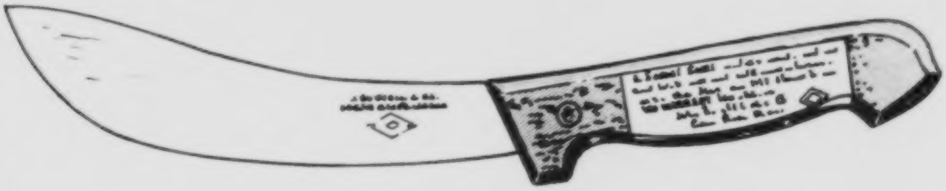
6" Sticking Knife — Used to sever the jugular vein of the animal. The knife has a straight blade with a double-edged tip.



STICKING KNIFE

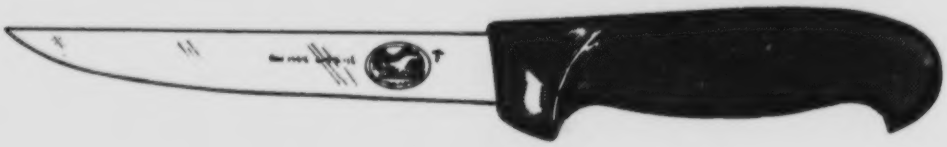
6" Skinning Knife — Used to separate skin from the carcass. The blade is generally heavier and curved.

NOTE: This knife is also used to scrape the hair from swine.



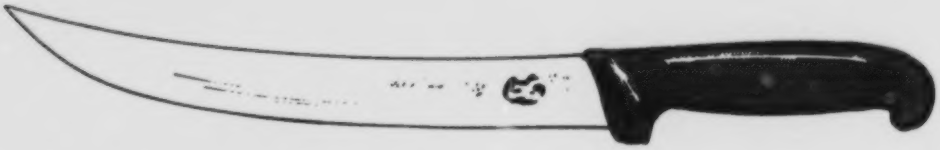
SKINNING KNIFE

5" - 6" Boning Knife — Used to remove meat from bone. The narrow blade allows you to get in and around the bone.



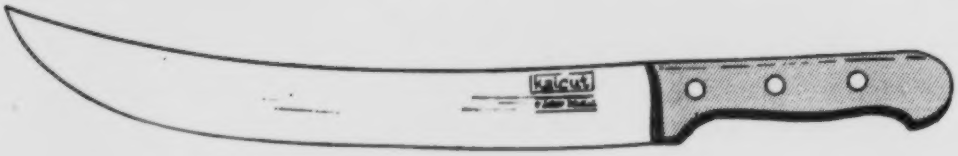
BONING KNIFE

8" Breaking Knife — Used for cutting large cuts such as roasts or steaks. The long, wide blade allows you to cut muscle in longer cuts.



BREAKING KNIFE

12" Carving Knife — Used for preparing full hams, standing rib roasts, leg of lamb, and turkey. The knife has a large curved handle.

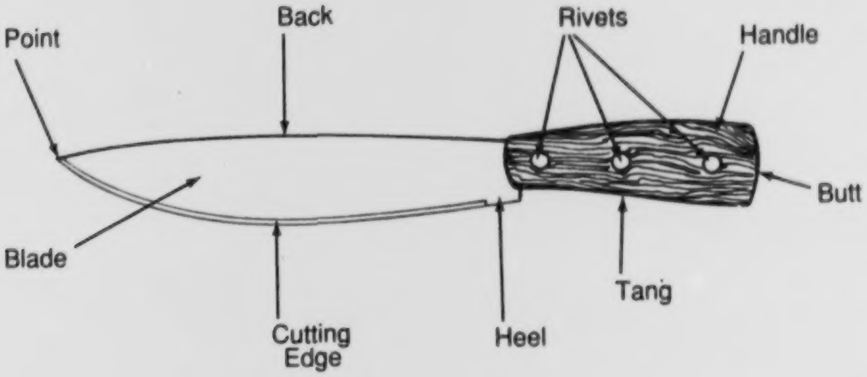


CARVING KNIFE

NOTE: The blade of your knife should be substantially larger than the item being cut.

OBJECTIVE 9 **Label the parts of a knife.**

The cost of a knife depends upon the quality of materials used to manufacture it and how it is constructed. You should be familiar with the two basic parts of a knife, the handle and blade, and their characteristics. This will enable you to purchase high quality instruments for specific cutting applications.



PARTS OF A KNIFE

OBJECTIVE 10 **Select from a list true statements regarding characteristics of knife handles.**

- The handle of a knife affects it durability, performance, safety, and sanitation.

  NOTE: The durability factor depends on the type of material used for the handle and how the handle and blades are joined together. The shape and thickness of the handle, such as smooth or form-fitting, are a matter of personal preference.

- Plastic, aluminum, or rubber handles are easy to clean.

  NOTE: Handles may be made from aluminum, plastic, hard rubber, pressed wood, or rosewood.

- A beechwood handle is not desirable for meat cutters because it is soft wood.

  NOTE: Hard woods such as rosewood or pressed wood are best because they do not absorb grease easily and they are fairly resistant to detergents and the effects of automatic dishwashers.

- The portion of the blade that extends into the handle is called the tang.

- Rivets or metal pins are used to join wooden handles. This provides a tight and sanitary union.

  NOTE: Loose fitting handles invite moisture which causes cracking and also traps food particles. Plastic, aluminum; and rubber handles are usually tightly molded over the tang when manufactured and avoid the disadvantages of riveted handles.

- The length and position of the tang affects the way the knife is balanced.

- Most knives have a half tang or full tang. A full tang means the blade extends the length of the handle.

  NOTE: A partial or half tang knife may be a little lighter than a full tang knife. A partial tang shifts the weight of the knife toward the blade as gravity pulls it. A heavier handle will usually offset this weight difference to balance the knife.

OBJECTIVE 11 **Match the characteristics of a knife blade to their correct descriptions.**

A good understanding of the five characteristics of a knife blade will enable you to maintain sharp knives. The five characteristics include:

—Steel composition
—Width
—Thickness
—Blade design
—Type of edge

- **Steel Composition**

  Knife blades may be made from either carbon steel, stainless steel, or chrome-vanadium steel. The highest quality blades are composed of solid high-carbon, stain-resistant steel. The carbon content of the steel makes it tough and hard. A blade with a high carbon content will not chip easily and will stay sharper longer than a low carbon content blade. High carbon blades also stain easily so they are often specially processed with stain-resistant alloys.

  When carbon steel is alloyed (or joined) with chromium, a stainless steel blade is produced. This metal will not corrode or stain as its name implies. Stainless steel can be hard to sharpen and meat cutters have tended to avoid it. But technology has refined techniques to produce high-carbon stainless steel which will hold an edge equal to carbon steel.

Chrome-plated blades are produced by alloying carbon steel with chromium and vanadium. The chrome plating tends to wear away which makes the blade prone to stain.

- **Width**

The width of a blade is measured from the cutting edge to the back. A wide blade will wear longer than a narrow blade. A wide blade has two disadvantages:

—The width produces more surface drag against the meat.
—It is harder to turn.

NOTE: The width of the blade should match its intended use.

- **Thickness**

A knife with a thin blade will be flexible and drag less than a thicker blade although it is susceptible to breaking. A triton hone or carborundum stone is good for sharpening thin blades.

- **Blade design**

Blade design indicates the curve of the blade. It takes more pressure to cut with a straight blade than a curved one. To obtain a uniform cut when using a curved knife, start cutting with the curved edge and finish using the straight edge.

NOTE: Knife design is changing to meet stricter worker safety requirements.

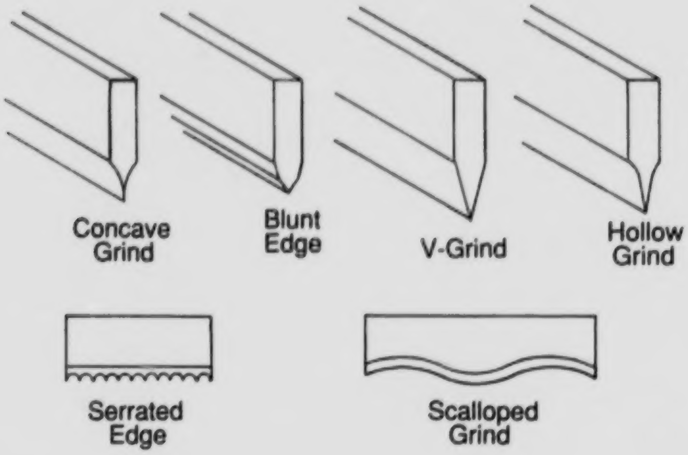
- **Type of edge**

The edge of a blade can be ground into many shapes:

—V-grind
—Blunt
—Hollow
—Concave
—Serrated
—Scalloped

The angle at which the blade is ground and the number of bevels on the edge determines how it is classified. A bevel is the sloped or angled surface of the blade.

The grinding process places a bevel (angle) and degree of fineness on the edge. The degree of fineness can range from course to medium to fine. Meat cutters desire a sharp knife with a smooth, fine cutting edge. In summary , the quality of steel, the hardness of the steel, and the way the blade is ground determine how long a blade will hold its sharp edge.



TYPES OF BLADE EDGES

OBJECTIVE 12

Arrange in order the steps for sharpening knives.

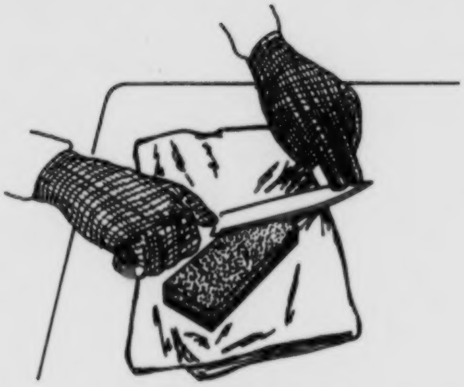
A new knife, freshly removed from its package, is not ready to be used until it has been honed and steeled. Once it is properly prepared, periodic maintenance should keep it cutting quite well.

The process of producing a sharp knife can be thought of in three steps:

1. **Grinding** — Placing an angle (bevel) and degree of fineness on the edge (is needed occasionally over many years).

2. **Honing** — Commonly called sharpening; maintaining the fineness of the edge (is needed a few times a year).

   Use a carborundum stone which has one rough side and another smooth side to hone the knife. You will cut the blade rapidly with the rough or coarse side, then smooth it with the fine side. An inexpensive stone can be purchased in a hardware store. You can expect the stone to wear out eventually, and its usefulness can be shortened even further by using improper short strokes which cause depressions in the stone.



HONING A KNIFE

3. **Steeling** — Smoothing the honed edge to produce a razor sharp condition (is needed several times a week).

   Steeling the blade straightens the edge and produces a smooth finish on the sharpened edge. Steels vary in length and roughness. A 10-inch smooth steel is good for general use. You may purchase steels in flat, round, or oval shapes.

OBJECTIVE 13

Select from a list true statements regarding knife storage and maintenance.

The method of storing knives varies with the type of work being performed. Retail meat cutters use racks, slots, or drawers to store knives. Storing knives in drawers is usually unsanitary and can be unsafe. Slotted storage racks or magnetic racks hung on walls are preferred over drawer storage. Meat cutters and packers generally wear scabbards to store a portion of their knives. Scabbards resemble belts and come in a variety of styles. They provide handy access to the most frequently used instruments. Knife storage is important in order to provide a safe manner for knife selection and to keep blades separate to protect edges.

OBJECTIVE 14

Select from a list true statements regarding the safe use of hand tools.

- Keep knives sharp.
- Dull knives are dangerous because they require you to use more force to cut the meat.
- Always use a steel with a guard to protect your hands and fingers.
- Place unused knives in proper storage containers.

- Always keep your free hand out of the cutting zone of the knife.

- Position meat to allow you to cut in a direction away from your body.

- Never leave a knife laying beneath a piece of meat; a concealed knife is dangerous.

- Store knife in proper location before carrying meat; do not carry meat and knives at the same time.

- Do not stick a knife into a bench as temporary storage. It damages the blade and your hand can easily slip and hit the blade.

- Use your hands to move meat; do not use hand tools as instruments to move meat.

- Step back from a falling knife and do not attempt to catch it.

BAND SAW MAINTENANCE TIPS

Blade tension	Proper tension provides straight, even cuts. Tension that is too tight can cause the blade to snap in operation; too loose and the blade may slip off pulley wheel. Improper tension causes crooked, uneven cutting and accidents.
Blade guides	Proper adjustment keeps blade sharp. Improper adjustment causes saw teeth to come in contact with the guides and dull the blade.
Back-up blade support	Proper adjustment holds the saw blade in place when an upper guide cutting pressure is applied. Improper adjustment allows blade to be pushed back when pressure is applied.
Moveable carriage or meat table	Clean, well-oiled bearings in good condition provide smooth and even ease of movement. Worn bearings allow side-play and uneven motion causing ragged, incorrect cuts. Side-play can lead to accidents. Forcing heavy meats on a sluggish moveable carriage can also cause accidents.
Back-up gauge plate	Provides even cuts if the bar which holds it keeps it rigid and intact when pressure is applied. A worn bar causes crooked cuts.
Wheel scrapers	Wheel scrapers prevent bone dust and fat build-up on pulley wheels. Worn wheel scrapers allow build-up and cause the blade to break or jump off the track which can lead to serious injury.
Pulley wheels	Clean, deep grooves in the pulley wheels keep the blade operation smooth and safe. Worn or smooth grooves can cause the blade to jump off the track and cause serious injury.
Saw blades	Sharp blades allow clean, even cuts. The additional pressure needed when using a dull blade can cause an accident. Dull blades cut unevenly. The friction and heat caused by using dull blades can discolor meat.

JOB SHEET 1

Development of:
READING SKILLS
EMPLOYABILITY SKILLS

- Introduce the assignment to the students by discussing why reading and employability skills are important.
- Discuss with them the following skills which are relevant to this task:

  READING SKILLS

  — Following written instructions

  — Using standard references

  EMPLOYABILITY SKILLS

  — Mastering specific job task/procedure

  — Developing good work habits/attitudes

- If students have difficulty following written instructions:

  — Discuss the possible consequences of not following instructions precisely.

  — Have them read the instructions several times, noting the key words and ideas.

- If students have difficulty using standard references:

  — Discuss the general information contained in a manufacturer's instruction manual.

  — Show the students other equipment manuals as examples.

- If students have difficulty mastering specific job task/procedure:

  — Emphasize the fact that practice makes a person proficient, and proficiency makes a person confident.

  - Suggest they study each component of the procedure to determine which area is causing difficulty.

  - Review the entire procedure before beginning.

- If students have difficulty developing good work habits/attitudes:

  - Encourage them to become familiar with the entire procedure before they begin the work.

  - Discuss the role that good work habits and attitudes have in obtaining and retaining employment.

  - Discuss what behaviors and attitudes constitute good work habits.

JOB SHEET 1 — EQUIPMENT AND EQUIPMENT MAINTENANCE — III

OBJECTIVE 15 **Maintain a band saw.**

INTRODUCTION

Band saws are available in various sizes. Complete the following procedures using the manufacturer's instructions for the band saw on site.

EQUIPMENT AND SUPPLIES

- Band saw
- Manufacturer's instruction manual
- Appropriately sized tools
- Cleaning supplies

PROCEDURE

Functional Reading Skills
- Follow written instructions

Research and Reference Skills
- Using standard references

Job Acquisition/ Development Skills
- Master specific job/task procedure
- Develop good work habits/attitudes

1. Check blade tension and adjust properly if necessary.
2. Check blade guides and adjust properly if necessary.
3. Adjust back-up blade support and upper guide assembly.
4. Check the bearings on the moveable carriage or meat table and oil if necessary.
5. Check for side play of moveable carriage or meat table and adjust if necessary.
6. Check the wear on the back-up gauge plate and test for movement when applying pressure.
7. Clean wheel scrapers and check for wear. Replace if necessary.
8. Clean grooves in pulley wheels with wire brush and check for wear. Replace if necessary.
9. Check sharpness of saw blades and replace if necessary.
10. Clean work area and put away equipment.

JOB SHEET 2

Development of:
READING SKILLS
MATHEMATICS SKILLS
EMPLOYABILITY SKILLS

- Introduce the assignment to the students by discussing why reading and employability skills are important.

- Discuss with them the following skills which are relevant to this task:

  READING SKILLS

  - Following written instructions
  - Using standard references

  MATHEMATICS SKILLS

  - Applying geometry principles

  EMPLOYABILITY SKILLS

  - Mastering specific job task/procedure
  - Developing good work habits/attitudes

- If students have difficulty applying geometry principles:

  - Using protractors or compasses, show the difference in various angles.
  - Have the students draw 90 degree right angles and divide them into 45 degree angles. Then show them how to approximate the 20 degree angle needed in the procedure.
  - Encourage them to become familiar with the entire procedure before they begin the work.

- For additional suggestions on teaching Basic Skills, refer to Instructional Supplement 1.

JOB SHEET 2

EQUIPMENT AND EQUIPMENT MAINTENANCE

III

OBJECTIVE 16

Hone a knife blade.

INTRODUCTION

Complete the following procedures for honing a knife using the materials supplied by the instructor.

EQUIPMENT AND SUPPLIES

- Carborundum stone or triton hone
- Knife
- Liquid soap or light mineral oil
- Soft cloth or towel

PROCEDURE

Functional Reading Skills

- Follow written instructions

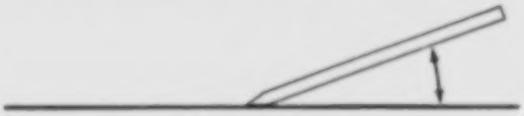
Research and Reference Skills

- Using standard references

Job Acquisition/ Development Skills

- Master specific job/task procedure
- Develop good work habits/attitudes

1. Lay the stone coarse side up on a soft cloth or towel so it will not slip. Apply a few drops of light mineral oil or liquid soap to lubricate the stone.
2. With the handle in your hand, gently place the heel of the blade (the portion closest to the handle) on the right end of the stone at approximately a 20° angle.



20° ANGLE

3. Using firm and even pressure, press down on the tip of the blade with the finger tips of the other hand.
4. Draw the blade across the stone with a right to left motion, making a long straight stroke.
5. Turn the blade over and repeat with a left to right motion.
6. Make several strokes then turn the stone to the fine side and repeat the procedure to produce a fine edge.
7. The blade is now ready for steeling.
8. Clean work area and put away equipment.

JOB SHEET 3

Development of:
READING SKILLS
MATHEMATICS SKILLS
EMPLOYABILITY SKILLS

- Introduce the assignment to the students by discussing why reading and employability skills are important.
- Discuss with them the following skills which are relevant to this task:

  READING SKILLS

  — Following written instructions

  — Interpreting graphics

  MATHEMATICS SKILLS

  — Applying geometry principles

  EMPLOYABILITY SKILLS

  — Mastering specific job task/procedure

  — Applying safety practices/procedures

  — Developing good work habits/attitudes

- If students have difficulty applying interpreting graphics:

  — Help them to understand that graphics are a visual representation of information.

  — Ask them to hold their hands like the hands in the picture on page 36, and then ask them to try to verbalize to another classmate how to hold their hands without the use of the picture.

- If students have difficulty applying safety practices/procedures:

  — Discuss the reasons for and the importance of each safety practice.

- Instruct them in the use of various techniques to help them remember safety practices.

- Visualization — making a mental picture.

  EXAMPLE: Visualize how a person looks steeling a knife: wearing steel mesh glove and pointing the knife away from the body, using repeated downward strokes.

- Association — connecting a new term with something you already know.

  EXAMPLE: Connect putting on the steel-mesh glove with fastening the seat belt before they drive.

- For additional suggestions on teaching Basic Skills, refer to Instructional Supplements 1 and 2.

OBJECTIVE 17

Steel a knife blade.

INTRODUCTION

Complete the following procedures for steeling a knife using the materials supplied by the instructor.

EQUIPMENT AND SUPPLIES

- Steel-mesh glove
- Steel
- Knife

PROCEDURE

Functional Reading Skills

- Follow written instructions
- Interpret graphics & symbols

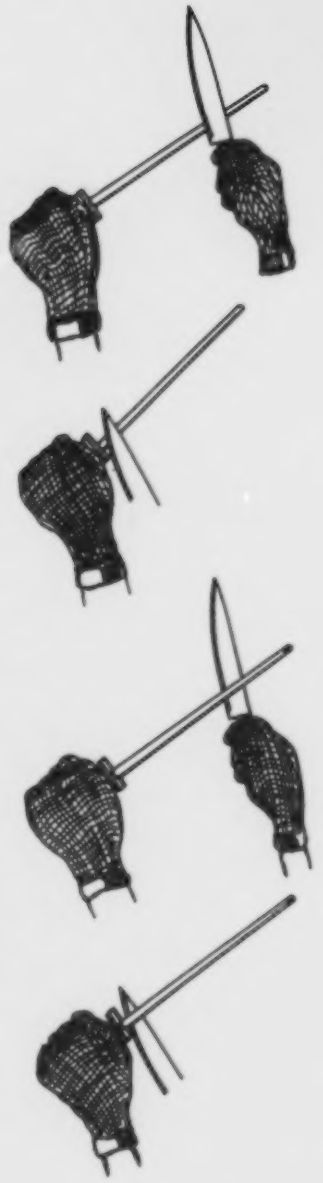
Math Application Skills

- Apply geometry skills

Job Acquisition/ Development Skills

- Master specific job/task procedure
- Develop good work habits/attitudes
- Apply safety practices/ procedures

1. Put on the steel-mesh glove. Hold the steel in your hand with the tip pointing upward and away from your body. Keep your thumb next to your knuckles and behind the guard piece.
2. With the knife in your hand, place the heel of the blade at the tip of the steel.
3. Maintain a 20° angle and swiftly draw the blade down the length of the steel toward your other hand. The entire length of the blade should touch the steel during the motion.
4. Place the other side of the knife on the opposite side of the steel in the same starting position.
5. Repeat the same downward, stroking motion.
6. Repeat the process until you obtain a fine, smooth edge.
7. Test the sharpness by slicing a piece of paper. A sharp knife will cut quickly and easily; a dull knife will tear.
8. Clean work area and put away equipment.



STEELING A KNIFE BLADE

JOB SHEET 1

Maintain a band saw.

Student's name ______________________ Date ____________

Evaluator's name ______________________ Attempt no. ______

Instructions: When you are ready to perform this task ask your instructor to observe the procedure and complete this form. All items listed under "Process Evaluation" must receive a "Yes" for you to receive an overall performance evaluation.

PROCESS EVALUATION

Evaluator note: Write a check mark in the "Yes" or "No" blanks to designate whether or not the student has satisfactorily achieved each step in this procedure. If the student is unable to achieve this competency, have the student review the materials and try again.

The student:	Yes	No
1. Checked the blade tension and adjusted it properly if necessary.	___	___
2. Checked blade guides and adjusted them properly if necessary.	___	___
3. Adjusted back-up blade supports and upper guide assembly.	___	___
4. Checked the bearings on the moveable carriage or meat table and oiled if necessary.	___	___
5. Checked for side play of moveable carriage or meat table and adjusted if necessary.	___	___
6. Checked the wear on the back-up gauge plate and tested for movement when applying pressure.	___	___
7. Cleaned wheel scrapers, checked for wear, and replaced if necessary.	___	___

8. Cleaned grooves in pulley wheels with wire brush, checked for wear, and replaced if necessary. ___ ___

9. Checked sharpness of saw blades and replaced if necessary. ___ ___

EVALUATOR'S COMMENTS

____

____

____

PRODUCT EVALUATION

Evaluator note: Rate the student on the following criteria by circling the appropriate numbers. Each criterion must receive a rating of "3" or higher to demonstrate student mastery. (See Performance Evaluation Key.) A student who is unable to demonstrate mastery should review the material and submit another product for evaluation.

Criteria:				
Adjusted bandsaw	4	3	2	1
Lubricated bandsaw	4	3	2	1
Cleaned bandsaw	4	3	2	1
Replaced saw blade	4	3	2	1
Cleaned work area and put away equipment	4	3	2	1

EVALUATOR'S COMMENTS

____

____

____

AVERAGE RATING

Evaluator note: To obtain an average rating for the competency profile, total the designated points in "Product Evaluation" and divide by the total number of criteria. Circle the rating on the "Performance Evaluation Key" below.

PERFORMANCE EVALUATION KEY

4 **Skilled** - Can perform job with no additional training
3 **Moderately Skilled** - Has performed job during training program; limited additional training may be required
2 **Limited Skill** - Has performed job during training program; additional training is required to develop skill
1 **Unskilled** - Is familiar with process, but is unable to perform job

JOB SHEET 2

Hone a knife blade.

Student's name ______________________ Date ____________

Evaluator's name ______________________ Attempt no. ______

Instructions: When you are ready to perform this task, ask your instructor to observe the procedure and complete this form. All items listed under "Process Evaluation" must receive a "Yes" for you to receive an overall performance evaluation.

PROCESS EVALUATION

Evaluator note: Place a check mark in the "Yes" or "No" blanks to designate whether or not the student has satisfactorily achieved each step in the procedure. If the student is unable to achieve this competency, have the student review the materials and try again.

The student:	Yes	No
1. Prepared the stone or hone properly.	___	___
2. Placed heel of knife blade on right side of stone at a 20° angle.	___	___
3. Used firm and even pressure when moving across the stone.	___	___
4. Used a right to left motion when moving across the stone.	___	___
5. Turned the blade over and repeated the stroking motion.	___	___
6. Used the fine side of the stone with proper stroking motions.	___	___
7. Produced a fine edge.	___	___

EVALUATOR'S COMMENTS

____

____

____

PRODUCT EVALUATION

Evaluator note: Rate the student on the following criteria by circling the appropriate numbers. Each criterion must receive a rating of "3" or higher to demonstrate student mastery. (See Performance Evaluation Key.) A student who is unable to demonstrate mastery should review the material and submit another product for evaluation.

Criteria:

Honed a knife blade	4	3	2	1
Cleaned work area and put away equipment	4	3	2	1

EVALUATOR'S COMMENTS

AVERAGE RATING

Evaluator note: To obtain an average rating for the competency profile, total the designated points in "Product Evaluation" and divide by the total number of criteria. Circle the rating on the "Performance Evaluation Key" below.

PERFORMANCE EVALUATION KEY

4 **Skilled** - Can perform job with no additional training
3 **Moderately Skilled** - Has performed job during training program; limited additional training may be required
2 **Limited Skill** - Has performed job during training program; additional training is required to develop skill
1 **Unskilled** - Is familiar with process, but is unable to perform job

JOB SHEET 3

Steel a knife blade.

Student's name ______________________ Date ____________

Evaluator's name ______________________ Attempt no. ______

Instructions: When you are ready to perform this task ask your instructor to observe the procedure and complete this form. All items listed under "Process Evaluation" must receive a "Yes" for you to receive an overall performance evaluation.

PROCESS EVALUATION

Evaluator note: Write a check mark in the "Yes" or "No" blanks to designate whether or not the student has satisfactorily achieved each step in this procedure. If the student is unable to achieve this competency, have the student review the materials and try again.

The student:	Yes	No
1. Held the steel using proper safety measures for protecting fingers and thumb.	____	____
2. Held the knife at the proper angle.	____	____
3. Used proper stroking motions on both sides of the blade.	____	____
4. Tested the sharpness of the blade properly.	____	____
5. Produced a fine, smooth edge.	____	____

EVALUATOR'S COMMENTS

____

____

____

PRODUCT EVALUATION

Evaluator note: Rate the student on the following criteria by circling the appropriate numbers. Each criterion must receive a rating of "3" or higher to demonstrate student mastery. (See Performance Evaluation Key.) A student who is unable to demonstrate mastery should review the material and submit another product for evaluation.

Criteria:

Steeled a knife	4	3	2	1
Cleaned work area and put away equipment	4	3	2	1

EVALUATOR'S COMMENTS

AVERAGE RATING

Evaluator note: To obtain an average rating for the competency profile, total the designated points in "Product Evaluation" and divide by the total number of criteria. Circle the rating on the "Performance Evaluation Key" below.

PERFORMANCE EVALUATION KEY

4 **Skilled** - Can perform job with no additional training
3 **Moderately Skilled** - Has performed job during training program; limited additional training may be required
2 **Limited Skill** - Has performed job during training program; additional training is required to develop skill
1 **Unskilled** - Is familiar with process, but is unable to perform job

WRITTEN TEST

EQUIPMENT AND EQUIPMENT MAINTENANCE

III

Name ______________________________ Score ____________

OBJECTIVE 1

Match the terms associated with equipment and equipment maintenance to their correct definitions. Write the correct letters in the blanks.

____ 1. The sloped or angled surface a knife blade

____ 2. Placing an angle (bevel) and degree of fineness on the edge of a knife blade

____ 3. Commonly called sharpening; maintaining the fineness of the edge of a knife blade

____ 4. Individual or company that sells meat and meat products individually or in small quantities directly to consumers

____ 5. Smoothing the honed edge of a knife blade to produce a razor sharp condition

____ 6. Individual or company that sells meat and meat products to retailers in relatively large quantities at a price lower than the retail sales price

____ 7. The study of the work environment and its relationship to the worker's health

____ 8. Wear and tear on the tendons, nerves and tissues in the joints caused by highly repetitive work

a. Retailer

b. Steeling

c. Bevel

d. Honing

e. Wholesaler

f. Consumer

g. Grinding

h. Tang

i. Repetitive trauma

j. Ergonomics

k. Economics

l. Boning

May be photocopied for student use.

OBJECTIVE 2 **Select from a list true statements about safety in meat cutting and meat processing.** Write an "X" in the blank before each correct answer.

_____ 1. Most accidents can be avoided by being conscious of the proper way to use tools and equipment.

_____ 2. The meat cutter should always be aware of the importance of personal safety as well as the safety of coworkers.

_____ 3. Your employer can follow federal safety regulations if he or she desires but he or she is not required to comply.

_____ 4. Safe work habits and safety procedures are the responsibility of both the meat cutter and his or her employer.

_____ 5. It is not necessary to turn off the power supply and unplug equipment before cleaning.

_____ 6. Never use defective tools or equipment.

_____ 7. Leaving carts or hand trucks in hallways is acceptable.

_____ 8. Report all accidents to your supervisor immediately, no matter how large or small.

_____ 9. If a new piece of equipment is introduced in the work place, it is acceptable to begin working on it if you plan to review the safety procedures later.

_____ 10. Safe work habits are expected in all aspects of the meat cutting and meat processing industry.

OBJECTIVE 3 **Match protective clothing to their intended uses.** Write the correct letters in the blanks.

_____ 1. Protects the wrist and fingers from cuts and scrapes.

_____ 2. Protects the wrists and forearms.

_____ 3. Shields the abdomen from knife injuries.

a. Stomach protector

b. Cuffs

c. Uniform

d. Steel-mesh gloves

e. Shoes

May be photocopied for student use.

_____ 4. Protects the head and prevents hair from falling on food.

_____ 5. Protects the feet from falling knives or heavy weights.

_____ 6. Protects ears from loud machinery noise.

f. Hard hat

g. Steel toe safety boots

h. Ear plugs

i. Leather gloves

OBJECTIVE 4

Select from a list true statements regarding types of meat cutting equipment. Write an "X" in the blank before each correct answer.

_____ 1. Meat cutting operations involve a variety of equipment that can generally be classified as power tools and hand tools.

_____ 2. Major types of power tools include knives, handsaws, cleavers, and steels used to sharpen knives.

_____ 3. Both large and small plants may use the same type of equipment but models may vary to suit the particular need or size of operation.

_____ 4. Power tools are used for efficient cutting and grinding operations.

_____ 5. The size of the processing plant often determines how sophisticated the tools and equipment will be.

OBJECTIVE 5

State the uses of power tools in processing meats.

1. Portable circular saws

____

____

2. Band saws (power saws)

____

____

May be photocopied for student use.

3. Meat grinders

____

____

4. Slicers

____

____

OBJECTIVE 6 **Select from a list true statements regarding safety rules for power tools.** Write an "X" in the blank before each correct answer.

_____ 1. Avoid wearing loose clothing that can become entangled or caught in power tools.

_____ 2. Talking with a coworker while he or she uses a power tool is harmless.

_____ 3. Start power tools only after checking to see if others are away or clear of the machine.

_____ 4. Force meat into the blades to allow the cutting blades to do the work.

_____ 5. Before returning a moveable carriage to the original position, carefully clear the meat from the path of the band saw blade. If this is not done, the meat can strike the back blade and cause it to jump off track.

_____ 6. Never walk away from a piece of equipment that is still running.

_____ 7. Turn off the master control power switch for all equipment when the machine will not be used for an extended period of time.

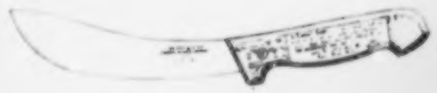
_____ 8. Disable or remove safety features on equipment if it will make it operate more efficiently.

May be photocopied for student use.

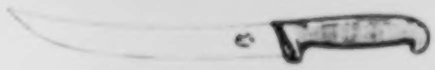
OBJECTIVE 7 Describe cutting tools and their uses.

May be photocopied for student use.

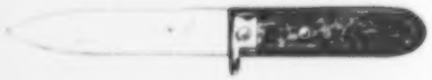
OBJECTIVE 8 **Match illustrations of knives with their intended uses.** Write the correct letters in the blanks.



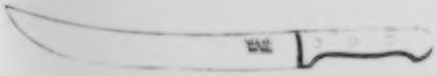
1. ____________________



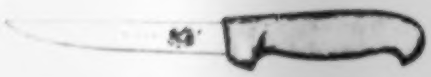
2. ____________________



3. ____________________



4. ____________________



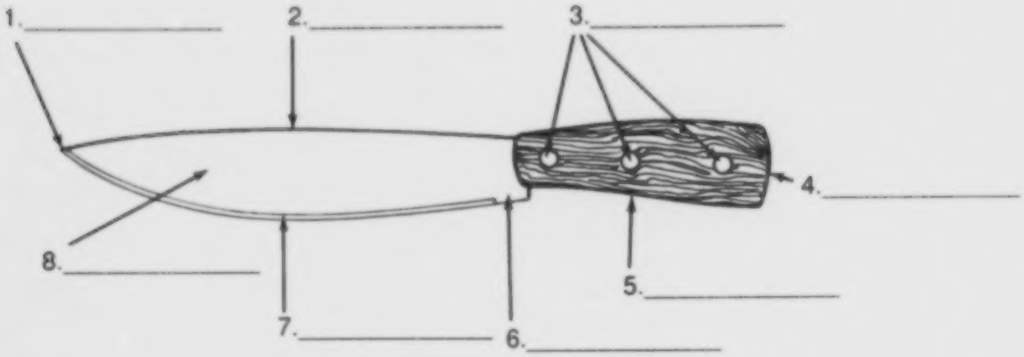
5. ____________________

a. 6" Sticking Knife--used to sever the jugular vein of the animal
b. 6" Skinning Knife--used to separate the skin from the carcass
c. 5" - 6" Boning Knife--used to remove meat from bone
d. 8" Breaking Knife--used for cutting large cuts such as roasts or steaks
e. 12" Carving Knife--used for preparing full hams, standing rib roasts, leg of lamb, or turkey

May be photocopied for student use.

OBJECTIVE 9 **Label the parts of a knife.** Write the correct letter in the blank.

a. butt
b. rivets
c. heel
d. tang
e. point
f. blade
g. back
h. cutting edge



OBJECTIVE 10 **Select from a list true statements regarding characteristics of knife handles.** Write an "X" in the blank before each correct answer.

____ 1. A beechwood handle is desirable for meat cutters because it is a hard wood.

____ 2. The handle of a knife affects its durability, performance, safety, and sanitation.

____ 3. The portion of the blade that extends into the handle is called the tang.

____ 4. A full tang means the blade extends the length of the handle.

____ 5. The length and position of the tang affects the sharpness of the blade edge.

____ 6. Plastic, aluminum, or rubber handles are easy to clean.

May be photocopied for student use.

OBJECTIVE 11

Match the characteristics of a knife blade to their correct definitions. Write the correct letters in the blanks.

_____ 1. Type of blade resulting from alloying carbon steel with chromium.

_____ 2. Highest quality blades.

_____ 3. Type of blade resulting from alloying carbon steel with chromium and vanadium.

_____ 4. Material that is good for sharpening thin blades.

_____ 5. Sloped or angled surface of the blade.

a. Bevel

b. Concave

c. Stainless steel

d. Chrome-plated

e. V-grind

f. Solid high-carbon, stain-resistant steel

g. Triton hone or carborundum stone

OBJECTIVE 12

Arrange in order the steps for sharpening knives. Write "1" before the first step, "2" before the second step and so on.

_____ Steeling - smoothing the edge to produce a razor- sharp condition

_____ Grinding - placing an angle and degree of fineness on the edge

_____ Honing - maintaining the fineness of the edge

OBJECTIVE 13

Select from a list true statements regarding knife storage and maintenance. Write an "X" in the blank before each correct answer.

_____ 1. Retail meat cutters use racks, slots, or drawers to store knives.

_____ 2. Slotted storage racks or magnetic racks hung on the walls are preferred over drawer storage.

_____ 3. Storing knives in drawers is usually unsanitary and can be unsafe.

May be photocopied for student use.

OBJECTIVE 14

Select from a list true statements regarding the safe use of hand tools. Write an "X" in the blank before each correct answer.

____ 1. Keep knives sharp; dull knives are dangerous.

____ 2. Always use a steel with a guard to protect your hands and fingers.

____ 3. Place unused knives in proper storage containers.

____ 4. Always keep your free hand out of the cutting zone of the knife.

____ 5. Position meat to allow you to cut in a direction towards your body.

____ 6. Never leave a knife laying beneath a piece of meat; a concealed knife is dangerous.

____ 7. Carry meat and knives at the same time to increase efficiency.

____ 8. Do not stick a knife into a bench as temporary storage. It damages the blade and your hand can easily slip and hit the blade.

____ 9. Use your hands to move meat; do not use hand tools as instruments to move meat.

____ 10. Step back from a falling knife and do not attempt to catch it.

____ 11. Dull knives are dangerous because they require you to use more force to cut the meat.

NOTE: Objectives 15-17 are evaluated on job sheets/assignment sheets in this unit. If you have not completed these components, see your instructor.

May be photocopied for student use.

WRITTEN TEST ANSWERS

EQUIPMENT AND EQUIPMENT MAINTENANCE

III

OBJECTIVE 1

1. c
2. g
3. d
4. a
5. b
6. e
7. j
8. i

OBJECTIVE 2

1, 2, 4, 6, 8, 10

OBJECTIVE 3

1. d
2. b
3. a
4. f
5. g
6. h

OBJECTIVE 4

1, 3, 4, 5

OBJECTIVE 5

1. Portable circular saws — are used to split and quarter carcasses.

2. Band saws (power saws) — are used for cutting through bones and muscles.

3. Meat grinders — are used to produce ground meat from meat muscle.

4. Slicers — are used to prepare slices of boneless meat.

OBJECTIVE 6

1, 3, 5, 6, 7

OBJECTIVE 7

1. Handsaws are hand tools used to cut through bones of large cuts of meat. Use a small handsaw for preparing smaller cuts such as chops. Large handsaws are best used to cut steaks or halve a carcass through a backbone.

2. Cleavers are larger and heavier than knives, making them especially useful for cutting the backbones of carcasses and for preparing various types of chops.

3. Knives are used for boning, cutting large cuts, sticking, or carving.

OBJECTIVE 8

1. b
2. d
3. a
4. e
5. c

OBJECTIVE 9

1. e
2. g
3. b
4. a
5. d
6. c
7. h
8. f

OBJECTIVE 10 2, 3, 4, 6

OBJECTIVE 11

1. c
2. f
3. d
4. g
5. a

OBJECTIVE 12 3, 1, 2

OBJECTIVE 13 1, 2, 3

OBJECTIVE 14 1, 2, 3, 4, 6, 8, 9, 10, 11

OBJECTIVE SHEET

PURCHASING LIVESTOCK FOR SLAUGHTER

IV

INTRODUCTION

The meat product industry is varied and constantly changing. There are many different factors to consider when purchasing livestock for slaughter. Species, breed, weight, age, condition, and health of the animals are very important considerations. It is essential not only to the packer, but to the retailer and eventually the consumer that you be proficient in livestock selection.

UNIT OBJECTIVE

After completing this unit, the student will be able to properly select sheep, cattle, and swine for slaughter. The student will demonstrate these competencies by completing the assignment sheets and written test with a minimum of 85 percent accuracy.

SPECIFIC OBJECTIVES

After completing this unit, the student will be able to

1. Match terms associated with purchasing livestock for slaughter to their correct definitions.
2. Select from a list factors to consider when purchasing livestock.
3. List factors affecting dressing percentage.
4. State the effect dressing percentage has on the value of an animal.
5. Select from a list factors affecting shrinkage.
6. State the effect of shrinkage on the value of an animal.
7. Compute break-even price.
8. Match classes of swine to their correct descriptions.
9. Match classes of sheep to their correct descriptions.
10. Match classes of cattle to their correct descriptions.
11. List characteristics of a healthy animal.
12. List characteristics of an unhealthy animal.
13. Arrange in order the steps in an ante-mortem inspection.
14. List methods of transporting livestock.

15. Select from a list factors to consider when transporting livestock.

16. List factors to consider when handling livestock.

17. Analyze the effects of dressing percentage on the value of an animal. (Assignment Sheet 1)

18. Analyze the effects of shrinkage on the cost of livestock. (Assignment Sheet 2)

19. Calculate break-even price on livestock. (Assignment Sheet 3)

161

PREPARATION

- Obtain materials to supplement unit.

  NOTE: See Suggested Resources.

- Review instructional outline for this unit. Modify time frames to suit class needs and plan activities for each class period.

- Study specific objectives to determine those you will cover in your presentation. Decide which objectives should be taught to which students.

- Determine scope and sequence of objectives that you add. Design and develop support materials, including evaluation techniques, for additional objectives.

- Determine how you will schedule time for students to demonstrate competence in the required procedures.

- Make arrangements for guest speakers. Supply speakers with specific objectives and other appropriate sections of the unit.

- Make arrangements to visit local livestock auction, feedlot, or packing plant.

- Collect livestock market information.

- Prepare classroom

  — Put up posters, charts, and other items dealing with purchasing livestock for slaughter.

  — Have articles, brochures, and other literature dealing with purchasing livestock for slaughter available for students.

DELIVERY

Objective 1

- Review terms.

- Take students to a local feedlot, sale barn, or packing plant for a review and to expose the students to some hands-on study.

- Ask local order buyer to give an overview of the livestock industry as it pertains to purchasing livestock for slaughter.

Objective 2

- Give students a list of the different types of packing plants and the classes of livestock that are specific to each.
- Provide the students with information concerning the best suppliers for each particular class of livestock.
- Have students collect data on current prices for the different classes of livestock.

Objective 3 and 4

- Discuss Handout 1 which gives the estimated dressing percentage for the different quality grades.
- Have students complete Assignment Sheet 1.
- View live animals at local sale barn, feedlot, or packing plant and estimate dressing percent.
- Have students calculate dressing percentage of given animals.
- Have students demonstrate the effect dressing percentage has on the animal's value by working sample problems comparing animals with equal live weight and different dressing percentage (DP).

Objective 5 and 6

- Give students examples of animals with differing fill, handling conditions, weather conditions, and distance transported and have students estimate shrink.
- Have students demonstrate the effects of shrink on the value of animals by solving example problems on assignment sheets.
- Have students complete Assignment Sheet 2.

Objective 7

- Have students complete Assignment Sheet 3.

Objectives 8 through 10

- Take students to a local sale barn and have them practice estimating weight and age of different animals.

- Have students identify the class of livestock used in a specific meat product.

- Take students to a sale barn, feedlot, or packing house and identify the different classes of livestock.

Objectives 11 and 12

- Take students to a local feedlot, sale barn, packing plant, or livestock producer and have them identify healthy animals and unhealthy animals.

- Have students identify the different symptoms when shown an unhealthy animal.

- Have a local veterinarian talk to students about the characteristics of healthy and unhealthy animals.

Objective 13

- Have a USDA inspector speak to the class about ante-mortem inspection.

- Take students to local packing plant and go through the steps in an ante-mortem inspection. Have students identify any suspect animals.

Objectives 14 and 15

- Take students to a sale barn on sale day and look at the different types of trucks and trailers.

- Use Handout 2 and have students calculate loading limits for different sized trucks and trailers.

- Have students inspect a stock trailer to determine if it is safe for livestock.

- Give students a weather scenario and have them decide on the transportation accommodations.

Objective 16

- Provide livestock and facilities for students to practice working livestock.

APPLICATION

Objective 17

- Use Assignment Sheet 1 to have students analyze the effects of dressing percentage on the value of an animal.

Objective 18

- Use Assignment Sheet 2 to have students analyze the effects of shrinkage on the cost of livestock.

Objective 19

- Use Assignment Sheet 3 to have students calculate the procedure for figuring break-even price on livestock.

EVALUATION

Written Test

- Explain to students that they will be asked to demonstrate on the written test actions listed in the specific objectives.
- Give written test.

  NOTE: The written test may be given in sections if desired.
- Evaluate the students on assignment sheet activities, if not previously done.
- Reteach and retest if necessary.
- Complete appropriate section of competency profiles.
- Review individual and group performance in order to evaluate teaching methods. Adjust scope, sequence or instructional approaches for additional lessons as required.

SUGGESTED RESOURCES

Electronic Media

- *Cattle for Tomorrow*. Available from Oklahoma State University, Extension Service, Animal Science Department, VT 45, Stillwater, OK 74078. (Color, VHS)
- *Handling Cattle*. Available from the Livestock Conservation Institute, 6414 Copps Avenue, Suite 204, Madison, WI 53716, (608) 221-4848. (Color, VHS)
- *Judging and Grading Beef, Sheep and Swine* Vocational Agriculture Service, University of Illinois, 436 Mumford Hall, Urbana, Illinois 61801.
- *Livestock Handling Guide*, Livestock Conservation Institute, 6414 Copps Avenue, Suite 204, Madison, WI 53716.
- *Livestock Trucking Guide*, Livestock Conservation Institute, 6414 Copps Avenue, Suite 204, Madison, WI 53716.

- *USDA Slaughter Grades for Beef and Swine*, USDA Livestock and Meat Standardization, Agriculture Market Service, USDA, 14th and Independence Avenue, S.W., Washington, D.C. 20250.

UNIT REFERENCES

- Krebs, Alfred H., *Agriculture In Our Lives*, 5th ed., Interstate Printers Publishers, Inc. 1984.
- *Livestock Handling Guide*, Livestock Conservation Institute, Madison, WI, 1988.
- *Livestock Trucking Guide*, Livestock Conservation Institute, Madison, WI, 1988.
- *Meat Processing Plant Employee*, Vocational Instructional Services, Texas A & M University, College Station, TX, 1985.

INFORMATION SHEET

PURCHASING LIVESTOCK FOR SLAUGHTER *IV*

OBJECTIVE 1

Match terms associated with purchasing livestock for slaughter to their correct definitions.

- **Ante mortem** — Before death or slaughter
- **Break-even price** — The price at which an animal can be purchased, processed, and marketed with no financial loss
- **Dressing percentage (DP)** — The percentage the carcass is of the live weight

  NOTE: Mud and dirt may effect dressing percentage.

  EXAMPLE: carcass weight - live wt. x 100 = DP
  (600 lbs - 1000 lbs) x 100 = 60 percent

- **Drop-credit** — The value of the hide and the offal in relation to slaughter costs

  EXAMPLE:

Value of hide..............	$35.00
Edible offal value.........	+20.00
Total value of DROP........	$55.00
Slaughter costs............	-25.00
DROP CREDIT................	$30.00

  NOTE: Drop credit helps to offset slaughter cost.

- **Fill** — The amount of feed and water in the animal's digestive system
- **Offal** — The internal organs including the heart, digestive, reproductive, and respiratory systems
- **Pencil shrink** — Subtracting an estimated amount of shrink automatically when purchasing livestock; 2 - 3 percent is customary
- **Post mortem** — After death
- **Shrinkage** — Loss of weight due to the elimination of body fluids
- **Suspect** — An animal suspected of having a disease or condition that may affect the disposition of the carcass

OBJECTIVE 2

Select from a list factors to consider when purchasing livestock.

Certain factors should be taken into consideration prior to purchasing livestock. These factors include:

- Class of livestock to be purchased

  EXAMPLES: Species, sex, age, weight, quality grade, yield grade, etc.

- The most efficient, practical, and economical supplier

  NOTE: Consider the number of livestock to be purchased, the distance livestock will be transported, reputation of the supplier, prices, and weather conditions.

- Physical condition of the animal to be purchased (ante-mortem inspection)
- Break-even price for the livestock
- The most practical and economical means of transport

  NOTE: Handle livestock properly before, during, and after transport.

- Dressing percentage
- Shrinkage

  NOTE: Adjustments in the livestock price bid may be necessary due to dressing percentage and shrinkage.

OBJECTIVE 3

List factors affecting dressing percentage.

- Fill (due to feed, water, and pregnancy)
- **Muscling** (the more muscling, the higher the DP)
- **Fat** (the more fat, the higher the DP)

  NOTE: Excess fat can adversely affect yield, which will lower value

OBJECTIVE 4

State the effect dressing percentage has on the value of an animal. (Assignment Sheet 1)

- The higher the dressing percentage, the higher the animal's value.

  EXAMPLE: Assuming a carcass price of $1.20/lb., what is the difference in value of Steer A that weighs 1200 lbs with 60 percent DP and Steer B that weighs 1200 lbs with 65 percent DP?

STEER A		STEER B	
1,200	(Live wt.)	1,200	(Live wt.)
x .60	(DP)	x .65	(DP)
720	(Carcass)	780	(Carcass)
x1.20		x1.20	
$ 864	(Value of Carcass)	$ 936	(Value of Carcass)

The difference between Steer A and Steer B ($936.00 - $864.00) is $72.00.

OBJECTIVE 5

Select from a list factors affecting shrinkage.

NOTE: Handling practices, weather, and transportation will be covered more extensively in Objectives 15 and 16.

- Fill

  NOTE: Animals on high moisture feed such as green pasture, silage or grain ration will be subject to greater shrink.

- Handling
- Weather
- Distance transported

  NOTE: Livestock shrink about 4 percent in the first 2 hours of transit.

OBJECTIVE 6 **State the effect of shrinkage on the value of an animal.** (Assignment Sheet 2)

- The higher the amount of shrink, the lower the value of an animal.

EXAMPLE: Assume a 1200 lb steer under normal conditions on an 8-hour trip from market to packer. With a purchase price of $65.00/cwt and estimated shrink of 5 percent, what is the decrease in value of the steer?

1,200 (Live wt.)
x .05 (percent Shrink)
60 (lbs Shrink)
x .65 (Purchase price)
$39.00 (Decrease in value)

NOTE: When purchasing fat stock from a private supplier, such as a feedlot, it is customary to pencil shrink livestock or to pay on the weight of livestock after transport.

OBJECTIVE 7 **Compute break-even price.** (Assignment Sheet 3)

- Break-even price = (Carcass value + Drop Credit) ÷ Live Weight x 100

EXAMPLE:
240 lb. U.S. No. 1 Market Barrow
72 percent Dressing Percent (DP)
$.85/lb Carcass price
$20.00 Drop Credit

240 x .72 = 173 lbs Carcass weight (172.80 rounded up to 173)

173 x .85 = $147.05 Carcass value

$147.05 + $20.00 = $167.05

(167.05 ÷ 240) x 100 = $70.00/cwt Break-even price

OBJECTIVE 8 **Match classes of swine to their correct descriptions.**

NOTE: Refer to Unit VI, *Quality and Yield Grading*.

- **Roasting pig (feeder pig)** — Roasting pigs range in live weight from 30-60 lbs, are less than 3 months of age (shoat), and include barrows, gilts, and boars.

NOTE: Carcass is not split.

- **Butcher barrows and gilts** — Butcher barrows and gilts make up the majority of the processed pork industry and are marketed as consumer retail cuts.

U.S. No. 1 & 2	180-250 lbs	3-9 months old
U.S. No. 3 & 4	220-300 lbs	5-9 months old

- **Butcher sows, stags, and boars** — Primary use is boneless, manufactured, and processed meats such as sausage, wieners, and sandwich meats.

U.S. No. 1 & 2	270-400 lbs	9-24 months old
U.S. No. 3 & 4	400 lbs & up	24 months & older

OBJECTIVE 9

Match classes of sheep to their correct descriptions.

- **Hot house lamb** — Primary market is in the spring, particularly during Easter, for use in many ethnic or religious feasts.

30-60 lbs live wt.	6-16 weeks old

- **Slaughter lamb** — Slaughter lambs make up the majority of the processed sheep industry and are marketed as consumer retail cuts.

60-120 lbs live wt.	3-8 months (New Crop)
	8-14 months (Old Crop)

- **Yearling mutton** — Primary use is boneless, manufactured and processed meats such as sausage, or in soup.

No Specific weight	14-24 months old

- **Mutton** — Primary use is boneless, manufactured and processed meat such as sausage or in soup.

No Specific weight	24 months and older

OBJECTIVE 10

Match classes of cattle to their correct descriptions.

- **Veal** — Veal is marketed as consumer retail cuts.

No Specific weight	Under 3 months

- **Baby beef (calf)** — Calf is marketed as consumer retail cuts.

No Specific weight	3-9 months

- **Slaughter steers and heifers** — Steers and heifers make up the majority of the processed beef industry and are marketed as consumer retail cuts.

850-1400 lbs live weight (1200 lbs average)	9-36 months (18 month average)

  NOTE: Slaughter steers and heifers will quality grade as prime, choice, select, or standard with the majority being choice (-) or select (+).

- **Slaughter cows** — Primarily used in boneless, manufactured and processed meats such as hamburger, bologna, and wieners.

No Specific weight	36 months

- **Slaughter bullocks (young bulls)**

No Specific weight	9-30 months

- **Slaughter bulls** — Primarily used in boneless, manufactured, and processed meats.

No Specific weight	30 months and older

  NOTE: Slaughter cows, bullocks, and bulls will quality grade as breaker utility, boner utility, commercial, cutter, or canner.

OBJECTIVE 11

List characteristics of a healthy animal.

- Normal urine and feces
- Eats regularly and aggressively
- Appears unworried when resting
- Can move about with ease
- Possesses normal eye, mucous membrane, and skin color
- Has shiny hair coat
- Has no abnormality in breathing, pulse rate, or temperature

  NOTE: Before you can identify a diseased animal, you must know the characteristics of a healthy animal.

OBJECTIVE 12 **List characteristics of an unhealthy animal.**

- Abnormal discharge from nose, mouth, or eyes
- Decreased feed and water consumption or total absence of feeding
- Unusual posture
- Limping or inability to walk
- Listlessness
- Extreme nervousness
- Coughing, sneezing, and wheezing
- Diarrhea, blood in urine or feces
- Pale or discolored mucous membranes lining the eyes and gums
- Inflammation or swelling on or under the skin or hide
- Rough hair or absence of hair
- Abnormally low or high temperature, pulse rate, or breathing rate

OBJECTIVE 13 **Arrange in order the steps in an ante-mortem inspection.**

1. Observe animals from outside the pen while they are at rest.
2. Notice general conduct to determine whether they are fatigued or resting quietly.
3. Notice general appearance of each animal, particularly respiration, nasal discharge, eyes, and feces.
4. Observe animals in motion by entering the pen and moving them about.
5. Notice any animals that are lame, move stiffly, or have any central nervous system involvement.
6. Notice any females with indications of mastitis or retained placenta.
7. Check that stags and boar hogs are separated from regular kill and identified for post-mortem examination for odor.

8. Check that all abnormal animals are tagged as "suspect" and segregated from regular kill so that a more thorough postmortem examination can be made.

9. Check that all normal animals are passed for slaughter.

OBJECTIVE 14 **List methods of transporting livestock.** (Handout 2)

- Light duty truck and trailer
- Truck and semi-trailer
- Heavy duty bob-tail truck
- Train
- Plane

OBJECTIVE 15 **Select from a list factors to consider when transporting livestock.**

- Select the proper type and size of vehicle for the number and species of the animals to be transported.
- Condition load for transit.

  NOTE: Animals that are receiving high shrinkage feeds such as silage, green grass, or grain ration should gradually be changed to hay and withheld from feed and water two to four hours before shipping.

- Observe weather conditions for the entire shipping route.

  NOTE: Temperature and humidity affect shrinkage, death losses, and appearance of animals upon arrival at the slaughter facility.

- Drive carefully.

  NOTE: Do not be a "hot rodder" and avoid sudden stops and starts. Drive slower on bumpy, curving roads.

- Avoid excessive load time.

  NOTE: Increasing the time in transit increases shrinkage.

- Inspect load in transit.

  NOTE: If animals are down, an attempt should be made to get them on their feet.

- Handle livestock carefully at all times.

  NOTE: In summer provide good ventilation and avoid travel during extreme heat and humidity. If possible, wet livestock before loading. In winter animals should be protected from severe weather by covering the top, front, and sides of the truck or trailer.

OBJECTIVE 16

List factors to consider when handling livestock.

- Use common sense when moving livestock. Allow them to move smoothly without undue excitement.
- Inspect pens, chute, and trailer periodically for hidden dangers such as protruding nails, broken boards, lose panels, or broken hinges.
- Avoid bruising animals with canes, whips, and clubs or by kicking and prodding. Sheep should not be handled by their wool.

  NOTE: Bruises cost money because bruised meat cannot be eaten and extra labor is required to trim the bruised area.
- If possible, different sexes, ages, and weights should be separated by partitions.
- Never crowd animals in lots, pens, or livestock trailers. Every effort should be made to reduce stress.

EXPECTED DRESSING PERCENTAGE GUIDE SHEET

200 # Market Barrow and Gilts (with overnight shrinkage)

Extra Meaty	U.S. No. 1	71-75 percent
Typical	U.S. No. 1	70-74 percent
	U.S. No. 2	71-75 percent
	U.S. No. 3	72-76 percent
	U.S. No. 4	73-75 percent
	U.S. Utility	66-69 percent

Cattle (near 1000# on "fed" cattle; cows variable wts; overnight shrinkage)

Prime	62-65 percent
Choice	61-64 percent
Good	59-62 percent
Standard	56-59 percent
Commercial	55-58 percent
Utility	50-54 percent
Cutter	45-49 percent
Canner	43-46 percent

Lambs (100# wts.; overnight shrinkage)

	Medium Wools	Westerns
Prime	55-58 percent	53-56 percent
Choice	53-56 percent	50-53 percent
Good	50-53 percent	45-50 percent
Utility	45-50 percent	43-48 percent
Cull	40-44 percent	39-43 percent

NUMBERS OF ANIMALS FOR SAFE LOADING

CATTLE

AVERAGE WEIGHT OF CATTLE, LBS

FLOOR LENGTH (FT)	450 (NO.)	600 (NO.)	800 (NO.)	1000 (NO.)	1200 (NO.)	1400 (NO.)
8	8	7	5	4	4	3
12	13	10	8	7	6	5
18	20	16	13	11	9	8
24	27	22	17	15	13	11
30	34	27	22	19	16	14
42	48	39	31	28	22	20

SHEEP

NUMBER PER DECK

AVERAGE WEIGHT OF SHEEP, LBS

FLOOR LENGTH (FT)	60 (NO.)	80 (NO.)	100 (NO.)	120 (NO.)
8	28	23	20	18
12	43	35	31	28
18	65	54	48	43
24	88	73	65	58
31	110	92	81	73
36	133	110	98	88

HOGS

SINGLE DECK

AVERAGE WEIGHT OF ANIMALS, LBS

FLOOR LENGTH (FT)	150 (NO.)	200 (NO.)	250 (NO.)	350 (NO.)
8		21	18	1411
15	39	33	27	21
24	62	52	44	34
30	77	66	55	42

HOGS FLOOR LENGTH (FT.)	DOUBLE DECK (TOTAL BOTH DECKS) AVERAGE WEIGHT OF ANIMALS, LBS 150 (NO.)	200 (NO.)	250 (NO.)	350 (NO.)
8	21	18	14	11
15	39	33	27	21
24	62	52	44	34
30	77	66	55	42

ASSIGNMENT SHEET 1

Development of:
MATHEMATICS SKILLS

- Introduce the assignment to the students by discussing why mathematic skills are important.
- Discuss with them the following skills which are relevant to this task:

  MATHEMATICS SKILLS

  - Calculating with whole numbers
  - Calculating with fractions
  - Calculating with decimals
  - Solving word problems
  - Selecting/applying mathematical procedure
  - Solve percent problems
  - Interpret charts and tables

- If students have difficulty calculating with whole numbers, review basic addition, subtraction, multiplication, and division.
- If students have difficulty calculating with fractions:
  - Draw various pies or series of squares representing fractional parts and discuss their relationship to the whole.
  - Review addition, subtraction, multiplication, and division of fractions.
- If students have difficulty calculating with decimals:
  - Remind students that the decimal indicates tenths.
  - Relate the decimal to common fractions.

- Demonstrate how to place the decimal for addition, subtraction, multiplication, and division.
- Remind students that our money system is a decimal system.

● If students have difficulty solving word problems and selecting/applying math formulas:

- Instruct them to find the key elements of the problem.

  EXAMPLE: "What is the **difference** in weight between the **lowest** DP and the **highest** DP?"

- Instruct them to reword the problem in a form that is clearer to them.

  EXAMPLE: "What is the difference in carcass weight between the lowest DP of ___ and the highest of ___ ?"

  Possible rewording: "The lowest DP is ___. The highest DP is ___. The difference between them is ___.

● If students have difficulty solving percent problems:

- Show them how a percent is a decimal expression of a fraction.
- Show them how percent is a relationship of tenths, hundredths, thousandths, etc.
- Refer back to addition, subtraction, multiplication, and division of decimals.

● If students have difficulty interpreting charts and tables, review the purpose of the chart and define the elements.

ASSIGNMENT SHEET 1

PURCHASING LIVESTOCK FOR SLAUGHTER

IV

Name ______________________ Score __________

OBJECTIVE 17

Analyze the effects of dressing percentage on the value of an animal.

INTRODUCTION

Objective 4 deals with the effects dressing percentage has on the value of an animal. The questions on this assignment sheet will help you to better understand dressing percentage and its effects on the value of an animal.

DIRECTIONS

Read the following questions carefully and use the examples in the Information Sheets and Supplement 1 to help in answering the questions.

Operation and Calculation Skills
- Calculate with whole numbers
- Calculate with fractions
- Calculate with decimals

Math Application Skills
- Solve word problems
- Select/apply mathematical procedure
- Solve percent problems

Data Analysis and Display Skills
- Interpret charts and tables (numerical)

1. After animals have been purchased and delivered to the slaughter facility, what handling procedures could affect dressing percentage?

   ____

   ____

2. Assume you have purchased a load of US No. 1 and No. 2 butcher barrows and gilts that average 240 lbs with dressing percentage (DP) ranging from 71 percent to 75 percent:

   a. What is the difference in the carcass weight between the lowest DP (71 percent) and the highest DP (75 percent)?

   b. Assuming a carcass price of $.85/lb, what is the difference in value?

3. Assuming you butcher a load of canner and cutter cows that average 1100 lbs and range from DP of 43 percent to DP of 49 percent:

   a. What is the difference in the carcass weight between the lowest DP of 43 percent and the highest of 49 percent?

   b. Assuming a carcass price of $.95/lb, what is the difference in value?

4. What would the DP be of a lamb purchased with a live weight of 120 lbs and after slaughter produced a carcass of 66 lbs?

5. What is the DP of a barrow that weighs 260 lbs alive and has a carcass weight of 195 lbs?

6. Assuming a carcass price of $1.25/lb, what is the difference in value of two steers weighing 1250 lbs, one with a 61 percent DP and the other with a 65 percent DP?

ASSIGNMENT SHEET 2

Development of:
MATHEMATICS SKILLS

- Introduce the assignment to the students by discussing why mathematic skills are important.
- Discuss with them the following skills which are relevant to this task:

  MATHEMATICS SKILLS

  - Calculating with whole numbers
  - Calculating with fractions
  - Calculating with decimals
  - Solving word problems
  - Selecting/applying mathematical procedure
  - Solve percent problems

- For additional suggestions on teaching basic skills, refer to Instructional Supplement 1.

ASSIGNMENT SHEET 2

PURCHASING LIVESTOCK FOR SLAUGHTER

IV

Name ______________________________ Score ____________

OBJECTIVE 18

Analyze the effects of shrinkage on the cost of livestock.

INTRODUCTION

Objectives 5 and 6 deal with the effects shrinkage has on the cost of an animal. The questions on this assignment sheet will help you better understand shrinkage and its effects on the cost of an animal.

DIRECTIONS

Read the questions carefully and use the examples in the Information Sheets to help answer the questions.

Operation and Calculation Skills

- Calculate with whole numbers
- Calculate with fractions
- Calculate with decimals

Math Application Skills

- Solve word problems
- Select/apply mathematical procedure

1. Describe an animal that would be subject to a high shrink.

   ____

   ____

   ____

2. What would you estimate the weight loss due to shrink would be on a 1000 lb steer on a 2 hour trip from feedlot to packer?

3. How much weight would a 1100 lb. slaughter cow lose if it had 3 percent shrink during transport?

4. If you paid $.45/lb for the cow in question 3, how much money did you lose?

5. What was the percent of shrink from a 400 lb slaughter sow that weighed 384 lbs after transport?

6. On a load of 100 butcher barrows with an average weight of 240 lbs and a cost of $.42/lb, how much money would be lost due to a 3 percent shrink after transport?

7. How much money would you save on a pen of 250 slaughter lambs that averaged 120 lbs at $.72/lb if you figured a pencil shrink of 3 percent before the purchase?

ASSIGNMENT SHEET 3

Development of:
MATHEMATICS SKILLS

- Introduce the assignment to the students by discussing why mathematic skills are important.
- Discuss with them the following skills which are relevant to this task:

  MATHEMATICS SKILLS

  - Calculating with whole numbers
  - Calculating with fractions
  - Calculating with decimals
  - Solving formulae and equations
  - Solving word problems
  - Selecting/applying mathematical procedure
  - Solving percent problems
  - Applying algebra principles

- If students have difficulty solving formulae and equations:
  - Remind them to complete the operations inside the parentheses first.
  - Point out that the equal sign means that the value of the right side of the equation must equal the left side of the equation.
  - Some students may find it easier to use and remember the expression:

$$\text{Break-even price} = \frac{(\text{Carcass value} + \text{Drop Credit})}{\text{Live Weight} \times 100}$$

- If students have difficulty applying algebra principles, review the basic operations and symbols.
- For additional suggestions on teaching basic skills, refer to Instructional Supplement 1.

ASSIGNMENT SHEET 3 | *PURCHASING LIVESTOCK FOR SLAUGHTER*

IV

Name ______________________ Score__________

OBJECTIVE 19

Calculate break-even price on livestock.

INTRODUCTION

Objective 7 deals with computing break-even price. The questions on this assignment sheet will help you to better understand the value of a live animal.

DIRECTIONS

Read the questions carefully and use the examples in the Information Sheets to help answer the questions.

Operation and Calculation Skills

- Calculate with whole numbers
- Calculate with decimals
- Solve formulas and equations

Math Application Skills

- Solve word problems
- Select/apply mathematical procedure

1. What would be the break-even price of a 260 lb US No. 2 market barrow with a 70 percent DP if carcass price is $.82/lb and drop-credit is $22.00?

2. What would be the break-even price of a 1250 lb fat steer with a DP of 62 percent if carcass price is $1.22/lb and a drop-credit of $66.00?

3. What would be the break-even price of a 120 lb slaughter lamb with a DP of 54 percent if carcass price is $1.55/lb and a drop-credit of $16.00?

4. If you had a carcass of a 240 lb. US No. 1 hog with a 72 percent DP, a $23.00 drop-credit, and a live weight price of $.45/lb, what would be the least you could accept for the carcass?

ASSIGNMENT SHEET ANSWERS — PURCHASING LIVESTOCK FOR SLAUGHTER — IV

ASSIGNMENT SHEET 1

1. Feed and water intake

2. a. 10 lbs difference in carcass weight
   240 x .71 = 170.4 carcass weight
   240 x .75 = 180 carcass weight
   180 - 170.4 = 9.6

   b. $8.16 difference in value
   9.6 x .85 = $8.16

3. a. 66 lbs difference in carcass weight
   1100 x .43 = 473 carcass weight
   1100 x .49 = 539 carcass weight
   539 - 473 = 66

   b. 62.70 difference in value
   66 x .95 = $62.70

4. 55% DP
   (66 ÷ 120) x 100 = 55

5. 75% DP
   (195 ÷ 260) x 100 = 75

6. $62.50 difference in value
   1250 x .61 = 762.5 carcass weight
   1250 x .65 = 812.5 carcass weight
   812.5 - 762.5 = 50 lbs
   50 x $1.25 = $62.50

ASSIGNMENT SHEET 2

1. An animal on a high moisture feed that was hauled a long distance in adverse weather and not allowed adequate feed or water.

2. 40 lbs shrink
   1000 x .04 = 40

3. 33 lbs shrink
   1100 x .03 = 33

4. $14.85 loss
   33 x $.45 = $14.85

5. 400 - 384 = 16 lbs shrink
(16 ÷ 400) x 100 = 4
(4 percent shrink)

6. $302.40 loss
240 x .03 = 7.2 lbs
7.2 x $.42 = $3.02 loss per pig
$3.24 x 100 = $302.40

7. $648.00 savings
120 x .03 = 3.6 lbs
3.6 x $.72 = $2.59 savings per lamb
$2.59 x 250 = $648.00

ASSIGNMENT SHEET 3

1. $65.86/cwt
260 x .70 = 182 lbs carcass
182 x $.82 = $149.24 carcass value
$149.24 + $22.00 = $171.24
($171.00 ÷ 260) x 100 = $65.86

2. $80.92/cwt
1250 x .62 = 775 lbs carcass weight
775 x $1.22 = $945.50 carcass value
$945.50 + $66.00 = $1011.50
($1011.50 ÷ 1250) x 100 = $80.92

3. $97.03/cwt
120 x .54 = 64.8 lbs carcass weight
65 x $1.55 = $100.44 carcass value
$100.44 + $16.00 = $116.44
($116.44 ÷ 120) x 100 = $97.03

4. $40.30/cwt
240 x .72 = 172.8 lbs carcass weight
172.8 x $.45 = $77.76 live value
$77.76 + $23.00 = $100.76
($100.76 ÷ 240) x 100 = $40.30

WRITTEN TEST

PURCHASING LIVESTOCK FOR SLAUGHTER

IV

Name ______________________ Score __________

OBJECTIVE 1

Match terms associated with purchasing livestock for slaughter to their correct definition. Write the correct letters in the blanks.

____ 1. An animal suspected of having a disease or condition that may affect the disposition of the carcass

____ 2. The percentage the carcass is of the live weight

____ 3. The price at which an animal can be purchased, processed, and marketed with no financial loss

____ 4. The amount of feed and water in an animal's digestive system

____ 5. Before death or slaughter

____ 6. Loss of weight due to the elimination of body fluids

____ 7. The value of the offal in relation to slaughter costs

____ 8. The internal organs including the heart, digestive, reproductive, and respiratory systems

____ 9. After death

____ 10. Subtracting an estimated amount of shrink automatically when purchasing livestock

a. Ante mortem
b. Carcass weight
c. Dressing percentage
d. Drop-credit
e. Silage
f. Profit margin
g. Shrinkage
h. Suspect
i. Break-even price
j. Fill
k. Purchase percentage
l. Post mortem
m. Pencil shrink
n. Offal

May be photocopied for student use.

OBJECTIVE 2

Select from a list factors to consider when purchasing livestock. Write an "X" in the blank before each factor.

_____ 1. Class of livestock to be purchased

_____ 2. Available dates of purchase

_____ 3. Break-even price for the livestock

_____ 4. The most efficient, practical, and economical supplier

_____ 5. Fill

_____ 6. The most practical and economical means of transport

_____ 7. Type of feed and feed schedule

_____ 8. Percentages of castrated animals and females to total number of animals

_____ 9. Shrinkage

_____ 10. Dressing percentage

_____ 11. Physical condition of the animal to be purchased

OBJECTIVE 3

List factors affecting dressing percentage. List two factors in the space provided.

____

____

OBJECTIVE 4

State the effect dressing percentage has on the value of an animal.

____

____

____

May be photocopied for student use.

OBJECTIVE 5

Select from a list factors affecting shrinkage. Write an "X" in the blank before each correct answer.

___ 1. Handling

___ 2. Altitude

___ 3. Weather

___ 4. Distance transported

___ 5. Breed of livestock

___ 6. Age of animal

___ 7. Fill

OBJECTIVE 6

State the effect of shrinkage on the value of an animal.

____

____

____

OBJECTIVE 7

Compute break-even price. Complete the problem in the space provided.

Compute the break-even price of a 250 lb US No. 1 market barrow with dressing percentage of 72 percent and a $25.00 drop credit if the carcass price is $.80/lb.

May be photocopied for student use.

OBJECTIVE 8

Match classes of swine to their correct descriptions. Write the correct letters in the blanks.

_____ 1. Range in live weight from 30-60 lbs, are less than 3 months of age (shoat), and include barrows, gilts, and boars

_____ 2. Primary use is boneless, manufactured, and processed meats such as sausage, wieners, and sandwich meat

_____ 3. Make up the majority of the processed pork industry and are marketed as consumer retail cuts

a. Butcher barrows and gilts

b. Roasting pig (feeder pigs)

c. Butcher sows, stags, and boars

OBJECTIVE 9

Match classes of sheep to their correct descriptions. Write the correct letters in the blanks.

_____ 1. 14-24 months of age; primary use is in boneless, manufactured, and processed meats such as sausage, or in soup

_____ 2. Primary market is in the spring, particularly during Easter, for use in many ethnic or religious feasts

_____ 3. 24 months of age or older; primary use is in boneless, manufactured, and processed meats such as sausage, or in soup

_____ 4. Make up the majority of the processed sheep industry and are marketed as consumer retail cuts.

a. Slaughter lamb

b. Mutton

c. Hot house lamb

d. Yearling mutton

May be photocopied for student use.

OBJECTIVE 10

Match classes of cattle to their correct descriptions. Write the correct letters in the blanks.

____ 1. Primarily used in boneless, manufactured, and processed meats; 30 months of age or older

____ 2. Primarily used in boneless, manufactured, and processed meats such as hamburger, bologna, and wieners; about 36 months of age

____ 3. Make up the majority of the processed beef industry and are marketed as consumer retail cuts; 850-1400 lbs. live weight; 9-36 months of age

____ 4. Marketed as consumer retail cuts; 3-9 months of age

____ 5. Primarily used in boneless, manufactured, and processed meats; 9-30 months of age

____ 6. Marketed as consumer retail cuts; under three months of age

a. Baby beef (calf)

b. Veal

c. Slaughter cows

d. Slaughter steers and heifers

e. Slaughter bulls

f. Slaughter bullocks

OBJECTIVE 11

List characteristics of a healthy animal. Write four characteristics in the space below.

____

____

____

____

May be photocopied for student use.

OBJECTIVE 12 **List characteristics of an unhealthy animal.** Write five characteristics in the space below.

____

____

____

____

____

OBJECTIVE 13 **Arrange in order the steps in an ante-mortem inspection.** Write a "1" in front of the first step, a "2" in front of the second and so on.

_____ Observe animals in motion by entering the pen and moving them about.

_____ Notice any females with indications of mastitis or retained placenta.

_____ Check that all normal animals should be passed for slaughter.

_____ Observe animals from outside the pen while they are at rest.

_____ Notice general appearance of each animal, particularly respiration, nasal discharge, eyes and feces.

_____ Check that stags and boar hogs are separated from regular kill and identified for post-mortem examination for odor.

_____ Notice any animals that are lame, move stiffly or have any central nervous system involvement.

_____ Notice general conduct to determine whether they are fatigued or resting quietly.

_____ Check that all abnormal animals are tagged as "Suspect" and segregated from regular kill so that a more thorough post-mortem examination can be made.

May be photocopied for student use.

OBJECTIVE 14 **List methods of transporting livestock.** Write three methods in the space provided.

____

____

____

OBJECTIVE 15 **Select from a list factors to consider when transporting livestock.** Write an "X" in the blank before each factor.

____ 1. Handle each animal individually

____ 2. Inspect load in transit

____ 3. Condition load for transit

____ 4. Keep temperature within the appropriate range to avoid shrinkage

____ 5. Handle livestock carefully at all times

____ 6. Maintain regular feed schedule

____ 7. Avoid excessive load time

____ 8. Observe weather conditions for the entire shipping route

____ 9. Keep transportation time to under three days

____ 10. Drive carefully

____ 11. Select the proper type and size of vehicle for the number and species of the animals to be transported.

____ 12. Wash down animals daily

OBJECTIVE 16 **List factors to consider when handling livestock.** Write three factors in the space provided.

____

____

____

____

____

May be photocopied for student use.

NOTE: Objectives 17-19 are evaluated on job sheets/assignment sheets in this unit. If you have not completed these components, see your instructor.

May be photocopied for student use.

WRITTEN TEST ANSWERS

PURCHASING LIVESTOCK FOR SLAUGHTER

IV

OBJECTIVE 1

1. h
2. c
3. i
4. j
5. a
6. g
7. d
8. n
9. l
10. m

OBJECTIVE 2

1, 3, 4, 6, 9, 10, 11

OBJECTIVE 3

Answer should include any two of the following:

- Fill
- Muscling
- Fat

OBJECTIVE 4

The higher the dressing percentage, the higher the animal's value.

OBJECTIVE 5

1, 3, 4, 7

OBJECTIVE 6

The higher the amount of shrink, the lower the value of an animal.

OBJECTIVE 7

$67.60/cwt
250 x .72 = 180 lbs carcass weight
180 x $.80 = $144.00 carcass value
$144.00 + $25.00 = $169.00
($169.00 ÷ 250) x 100 = $67.60

OBJECTIVE 8

1. b
2. c
3. a

OBJECTIVE 9

1. d
2. c
3. b
4. a

OBJECTIVE 10

1. e
2. c
3. d
4. a
5. f
6. b

OBJECTIVE 11

Answer should include any four of the following:

- Normal urine and feces
- Eats regularly and aggressively
- Appears unworried when resting
- Can move about with ease
- Possesses normal eye, mucous membrane, and skin color
- Has shiny hair coat
- Has no abnormality in breathing, pulse rate, or temperature

OBJECTIVE 12

Answer should include any five of the following:

- Abnormal discharge from nose, mouth, or eyes
- Decreased feed and water consumption or total absence of feeding
- Unusual posture
- Limping or inability to walk
- Listlessness

- Extreme nervousness
- Coughing, sneezing, and wheezing
- Diarrhea, blood in urine or feces
- Pale or discolored mucous membranes lining the eyes and gums
- Inflammation or swelling on or under the skin or hide
- Rough hair or absence of hair
- Abnormally low or high temperature, pulse rate, or breathing rate

OBJECTIVE 13 4, 6, 9, 1, 3, 7, 5, 2, 8

OBJECTIVE 14 Answer should include any three of the following:

- Light duty truck and trailer
- Truck and semi-trailer
- Heavy duty bob-tail truck
- Train
- Plane

OBJECTIVE 15 2, 3, 5, 7, 8, 10, 11

OBJECTIVE 16 Answer should include any three of the following:

- Use common sense when moving livestock. Allow them to move smoothly without undue excitement.
- Inspect pens, chute, and trailers periodically for hidden dangers such as protruding nails, broken boards, lose panels, or broken hinges.
- Avoid bruising animals with canes, whips, and clubs or by kicking and prodding. Sheep should not be handled by their wool.
- If possible, different sexes, ages, and weights should be separated by partitions.
- Never crowd animals in lots, pens, or livestock trailers. Every effort should be made to reduce stress.

OBJECTIVE SHEET

LIVESTOCK SLAUGHTER

V

INTRODUCTION

Livestock slaughtering refers to the killing and butchering of cattle and other animals for market. In this unit, you will begin using all you have previously learned. Slaughtering livestock is an art as well as a science that may take years to perfect. Learning the basic slaughter techniques is essential for efficient, quality work.

UNIT OBJECTIVE

After completing this unit, the student will be able to use livestock slaughter equipment in the slaughter process. The student will demonstrate these competencies by completing the job sheets and written test with a minimum of 85 percent accuracy.

SPECIFIC OBJECTIVES

After completing this unit, the student will be able to

1. Match terms associated with livestock slaughter to their correct definitions.
2. Match livestock equipment to their uses.
3. State procedures for preparing livestock for slaughter.
4. Match methods of immobilization to their correct descriptions.
5. Describe types of sticking.
6. Arrange in order the steps for dehairing hogs.
7. Arrange in order the steps for skinning hogs.
8. Arrange in order the steps for eviscerating hogs.
9. Arrange in order the steps for removing the pelt (skin) of sheep.
10. Arrange in order the steps for eviscerating sheep.
11. Arrange in order the steps for skinning a beef carcass.
12. Arrange in order the steps for eviscerating a beef carcass.
13. Slaughter a hog. (Job Sheet 1)
14. Slaughter a sheep. (Job Sheet 2)
15. Slaughter a beef animal. (Job Sheet 3)

PREPARATION

- Obtain materials to supplement unit.

  NOTE: See Suggested Resources.

- Review instructional outline for this unit. Modify time frames to suit class needs and plan activities for each class period.
- Study specific objectives to determine those you will cover in your presentation. Decide which objectives should be taught to which students.
- Determine scope and sequence of objectives that you add. Design and develop support materials, including evaluation techniques, for additional objectives.
- Determine how you will schedule time for students to demonstrate competence in the required procedures.
- Make arrangements for guest speakers. Supply speakers with specific objectives and other appropriate sections of the unit.
- Purchase livestock for slaughter.
- Check all equipment to be sure it is in good working condition.
- Set up a tour of local meat packing plant.
- Prepare classroom.
  - Put up posters, charts, and other items dealing with livestock slaughter.
  - Have articles, brochures, and other literature dealing with livestock slaughter available for students.

DELIVERY

Objectives 1 through 3

- Tour local meat packing plant.
- Invite personnel to speak to students.
- Take students on killing floor to familiarize them with equipment.

Objectives 4 and 5

- Tour local meat packing plant.
- Invite personnel to speak to students.
- Display stun guns, captive bolt guns, and various knives for students to view.
- Invite local rabbi to discuss ritual slaughter.
- Have students perform immobilization and sticking methods as part of job sheet.

Objectives 6, 7, and 8

- Tour a local meat packing plant to view hog slaughter.
- Invite personnel to speak to students.
- Have students complete Job Sheet 1.

Objectives 9 and 10

- Tour local meat packing plant to view sheep slaughter.
- Invite personnel to speak to students.
- Have students complete Job Sheet 2.

Objectives 11 and 12

- Tour local meat packing plant to view cattle slaughter.
- Invite personnel to speak to students.
- Have students complete Job Sheet 3.

APPLICATION

Objective 13

- Use Job Sheet 1 to give students experience in slaughtering a hog.

Objective 14

- Use Job Sheet 2 to give students experience in slaughtering a sheep.

Objective 15

- Use Job Sheet 3 to give students experience in slaughtering a beef animal.

EVALUATION

Practical Test

- Explain to students that they will be asked to demonstrate procedures on the job sheets to complete the practical test.
- Describe the rating scale used on the practical test.
- Give practical test.
- Reteach and retest if necessary.

Written Test

- Explain to students that they will be asked to demonstrate on the written test actions listed in the specific objectives.
- Give written test.

  NOTE: The written test may be given in sections if desired.
- Reteach and retest if necessary.
- Complete appropriate section of competency profiles.
- Review individual and group performance in order to evaluate teaching methods. Adjust scope, sequence, or instructional approaches for additional lessons as required.

SUGGESTED RESOURCES

- *USDA Grades for Slaughter Cattle and Swine.* Available through the USDA Livestock and Meat Standardization Branch, Agriculture Market Service, USDA, 14th and Independence Avenue, S.W., Washington D.C. 20250.

UNIT REFERENCES

- *Hides and Skins*, Education Committee, National Hide Association, Jacobsen Publishing Co., 1970.
- Libby, James A., DVM, *Meat Hygiene* Fourth Edition, Lea and Fibiger, 1975.
- *Meat, Animal and Carcass Evaluation Manual*, Department of Animal Science and Industry, Oklahoma State University, Stillwater, Oklahoma, 1976.
- Romans, John R., Jones, Costello, Carlson, and Ziegler, *The Meat We Eat*, Interstate Printers and Publishers, Inc., Danville, Illinois, 1985.

OBJECTIVE 1

Match terms associated with livestock slaughter to their correct definitions.

- **Bleeding or sticking** — Allowing an animal to bleed until death occurs by severing the carotid artery and jugular vein with a six- to seven-inch sticking knife
- **Break joint** — Epiphyseal cartilage at the end of the metacarpal where the foot is removed during slaughter

  NOTE: The break joint is present only in lamb and is an indication of age.
- **Caul or leaf fat** — Fat in pelvic area around the kidney
- **Dark cutter** — A chemical change in an over-excited animal which causes the meat to be darker than normal
- **Dehairing or scalding** — The process of removing hair from swine by scalding the carcass in hot water (135° - 160°F for 3 to 4 minutes) until hair pulls out easily; carcass is then placed in a dehairing machine and/or scraped with a knife or bell scraper
- **Eviscerate** — Removal of internal organs during slaughter including the heart, reproductive tract, respiratory, and digestive systems
- **Fell** — A thin, colorless, connective tissue membrane that separates the skin from the carcass
- **Fisting** — A method of skinning sheep by forcing the fist between the pelt and fell
- **Kosher** — A Hebrew word meaning "properly prepared" and is a method of slaughter performed by a rabbi or shohet on beef and sheep where the animal is bled without stunning
- **Offal** — The internal organs of an animal including the heart, digestive, respiratory, and reproductive systems

  NOTE: Offal is separated at the time of slaughter as edible or inedible.
- **Pluck** — The organs lying in the thoracic cavity, consisting of the heart, lungs, gullet, and windpipe

- **Shroud** — Unbleached cheese cloth immersed in warm salt water and pinned over the outside of the warm beef carcass to absorb blood, smooth external fat, and cause fat to appear white and dense
- **Symphysis** — The white tissue separating the hams or hind quarters; also the seam of the belly
- **Viscera** — The organs of the abdominal cavity including the stomach, intestines, liver, kidneys, and reproductive tract

OBJECTIVE 2

Match livestock equipment to their uses.

- **Livestock scales** — Scales used to weigh livestock
- **Stunning crate** — restraining device for immobilizing livestock
- **Stun gun** — Electric or captive bolt gun used to immobilize animal
- **Shackles/chain** — Used to hoist animal for bleeding
- **Scalding vat** — Large container of hot water used to scald hogs until hair will slip off
- **Dehairing machine** — A machine used, after scalding, to remove hair from hogs
- **Skinning machine** — Any one of a number of different types of machines used to remove skin from animals
- **Blow torch** — Flame torch used to singe hair remaining after dehairing
- **Knives and steel** — Used for sticking, scraping, skinning, or boning meat; a steel is a sharpening tool
- **Offal tank/cart** — Large, usually portable, tank for collecting and transporting offal
- **Meat hooks** — Device used to hoist carcass; inserted in achilles tendons on hind shank
- **Carcass scales** — Scales used to weigh carcass
- **Saw** — Used to cut bone, such as splitting the carcass
- **Flank spreaders** — Placed in carcass between back and flank to keep flank from rolling up

- **Sheep rack** — Device that holds the sheep on its back for sticking and skinning
- **Head tree** — Rack used to hold heads for inspection
- **Gambrel** — Device placed between the meat hooks, which are inserted in the achilles tendons of hind shank, for hoisting

OBJECTIVE 3 **State procedures for preparing livestock for slaughter.**

- Select only healthy animals in satisfactory condition.
- Keep the animal off feed for 24 hours prior to slaughter, but allow access to water.
- Weigh animal and record live weight in record book.

  NOTE: Every effort should be made to avoid exciting the animal. A dark cutter may result from over-excitement.

OBJECTIVE 4 **Match methods of immobilization to their correct descriptions.**

NOTE: The Federal Humane Slaughter Act of 1960 recognizes three methods of immobilization to produce complete unconsciousness with a minimum of excitement and discomfort.

- Mechanical

  Captive bolt guns may be operated by air pressure or by blank cartridges with different powder loads for different sized animals. The penetrating type enters the skull while the concussion type delivers a blow to the skull by way of a mushroom head on the end of a captive bolt.

  NOTE: Blank cartridges with powder loads for different sized animals are triggered by contact, similar to a pistol, to propel the bolt into the head, while others are operated by air pressure. The stunning can be administered to the forehead or in the back of the poll.

- Chemical

  The chemical method employs a 65 to 75 percent concentration of carbon dioxide. The CO_2 gas, which is heavier than air, is held in a pit with a minimum loss of gas. Animals, normally hogs, ride in individual compartments down an incline into the chamber. The time exposure to render the animal unconscious depends upon their size.

- Electrical

  The electrical method employs a hand-held electric probe that is placed on the animal's forehead for one to four seconds depending upon the weight of the animal. A five to seven second interval between stunning and sticking is recommended in order to avoid capillary rupture in the muscle causing unsightly blood spots in the meat.

OBJECTIVE 5 **Describe types of sticking.**

NOTE: A proper stick means a fast bleed.

- **Hogs** — Normally, the sticking is done with the hog lying on its side. A six- to seven-inch sticking knife for large hogs (400-600 lbs) should be inserted two inches in front of the breast with the point of the knife directed toward the tail. Give an upward thrust, dipping the point until it strikes the backbone and then withdraw the knife. Raise hog from the floor with shackles around one hind leg.

- **Sheep** — Normally, the sticking is done with the sheep lying on its back on a sheep rack. Grasp the jaw with the free hand, insert the knife behind the jaw, blade-edge outward and draw the knife out through the pelt.

- **Cattle** — (Standard method) Make an incision over the point of the brisket toward the jaw. Insert the knife in front of the brisket at a 45 degree angle and sever the carotid arteries and jugular vein.

  NOTE: The kosher method calls for hoisting the animal, without stunning it, and cutting across the throat. The stick is done by a rabbi or shohet with a 14-inch razor-sharp blade. The Humane Slaughter Act of 1960 does not apply to ritualistic slaughter methods.

OBJECTIVE 6 **Arrange in order the steps for dehairing hogs.**

1. Prepare scalding vat with water between 135° to 160°F.

   NOTE: The optimum temperature is 140°F.

2. With hog bled sufficiently and shackled by one hind leg, immerse into scalding vat and keep submerged and in motion.

3. Remove the carcass when flank hair pulls out easily (three-four minutes).

   NOTE: Hard hair months are October, November, and December; soft hair months are February, March, and April.

4. If a dehairing machine is not available, place carcass on scraping table. Remove dewclaws and toenails with hook.
5. Scrape the carcass with bell scraper or knife until clean.
6. With knife, open skin on hind legs just above the site of the dewclaws and insert gambrel under both tendons.
7. Raise carcass from scraping table and hang on the rail.
8. Singe the remaining bristles with a blow torch.
9. Rinse with hot water and shave any remaining hair.

OBJECTIVE 7

Arrange in order steps for skinning hogs.

1. After hog has bled sufficiently, place carcass on its back on a skinning rack.
2. Remove dewclaws and toenails with hooks.
3. Open skin down the back of the front and hind legs and down the middle of the belly.
4. Very carefully, keeping the knife against the skin, remove skin from legs, then belly and sides.

   NOTE: Great care should be taken to remove the hide without exposing the muscle.

5. Split skin from point of stick to jawbone and remove skin from jowl and neck just behind the ears.
6. Loosen tendons on hind legs and insert gambrel and hoist hog.
7. With hog hoisted and tail loosened, the skin can be pulled off the back.
8. Finish skinning the face, store the hide properly, and wash the carcass.

OBJECTIVE 8 **Arrange in order steps for eviscerating hogs.**

1. Open throat from point of stick to jawbone and from point of stick to sternum.

2. Remove tongue, wash, and save as edible offal.

3. Remove head at the atlas joint, wash head, and place on head tree.

4. Loosen esophagus and trachea and tie-off esophagus.

   NOTE: Tying off the esophagus avoids contaminating the carcass with contents of the rumen.

5. Separate the hams at the symphysis pubis. Remove penis at the point of attachment near pubis.

6. Loosen anus and vagina and tie off.

7. Remove all intestines up to the diaphragm and cut esophagus at the cardia. Leave kidney and leaf fat in body cavity.

8. Lift liver from the diaphragm and cut it loose. Remove gall bladder from liver, wash and save as edible offal.

9. Remove pluck and diaphragm (hanging tenderloin). Separate heart, wash and place with edible offal.

10. Split the carcass directly down the backbone but permit sides to remain attached by 2 inches of soft tissue.

11. Remove kidneys and leaf fat. Discard kidneys but save fat for lard.

12. Face hams.

    NOTE: Removing excess skin and fat from the edge of hams makes a more attractive carcass.

13. Wash, weigh, and tag carcass.

14. Insert flank spreaders and roll carcass and edible offal into cooler.

15. Place inedible offal in offal cooler.

16. Clean area and put away tools.

OBJECTIVE 9

Arrange in order the steps for removing the pelt (skin) of sheep.

1. After sheep has bled sufficiently, remove head at atlas joint.
2. Grasp the front legs at the front foot or hoof and split the skin down the front of the leg from fetlock to a point just in front of the brisket. Repeat on the other front leg.
3. Grasp the hind leg and open the skin down the back of the leg from the hoof to a point just below the rectum. Repeat on other hind leg.
4. Remove feet with the hide at the break joint.
5. Begin fisting at brisket and tunnel through to cod or udder fat, freeing pelt on both sides.
6. Open the neck from brisket to stick, loosen and tie the esophagus and windpipe.
7. Tie the hind legs together and hang on the rail to complete fisting.
8. Fist off pelt, working from heart girth upward over flank and hind legs. Free pelt with knife at dock and pull down over shoulders and neck.

   NOTE: Be careful not to puncture or tear the fell. The fell helps to protect muscle tissue from drying.

OBJECTIVE 10

Arrange in order the steps for eviscerating sheep.

1. Head was removed and esophagus tied during skinning.
2. Remove reproductive organs.
   a. On rams and wethers, remove penis at highest point.
   b. On ewes, loosen rectum and vagina and tie.
3. Open abdominal cavity, starting at cod or udder fat and keep viscera pushed back from knife with two fingers.
4. Remove viscera and place into offal tank, being careful not to cut bladder. Remove, wash, and save liver.
5. Remove pluck and diaphragm (hanging tenderloin). Separate and wash heart and place it with edible offal.
6. Trim neck, rinse out abdominal and thoracic cavity, and tie foreshanks against forearm.

7. Weigh, tag, and hang carcass in cooler with edible offal.

8. Place inedible offal in offal cooler.

9. Clean area and put away equipment.

OBJECTIVE 11

Arrange in order the steps for skinning a beef carcass.

1. After the animal has been thoroughly bled, skin head and remove at atlas joint. Remove tongue and place head on head tree for inspection.

2. Skin front leg by cutting all the way around pastern below dewclaws and opening hide along inside of the leg. Finish skinning shank and forearm and remove shank at smooth joint of the knee.

3. Lower carcass to the skinning cradle.

4. Skin hind legs similar to front leg, opening the skin along the back side of the leg to the cod or udder. Remove hind shank at enlargement of the hock.

5. Open the skin along ventral middle from stick to rectum or vagina.

6. Skin both sides of neck and continue siding as far as possible.

7. Remove penis and open the belly down the symphysis.

8. Cut through the fat at the brisket to sternum. Continue down the neck to expose esophagus and trachea.

9. Remove the sweetbread and tie the esophagus.

10. Saw through the sternum.

11. Insert beef trollies at achilles tendons and hoist carcass to a convenient height to skin and remove tail.

12. Loosen and tie anus, then continue to hoist carcass.

13. Pull hide from back, apply salt, roll, and store properly.

NOTE: Remember to remove brain and check meat from head after inspection.

OBJECTIVE 12 **Arrange in order the steps for eviscerating a beef carcass.**

NOTE: Much of the preliminary work has been performed during the skinning process.

1. Loosen anus and vagina and tie if not done during skinning.
2. Remove viscera and place into offal cart, leave kidneys in the carcass.
3. Save caul fat, liver, and separate stomach from intestine (muscles from rumen are edible offal).
4. Cut diaphragm and remove pluck. Save heart and diaphragm (hanging tenderloin) as edible offal.
5. Split carcass down backbone. Raise carcass to rail.
6. Score flank at stifle joint to remove wrinkles in loin, trim blood vessels from the neck.
7. Wash carcass inside and out with warm water.
8. Weigh and tag carcass, shroud, and place in cooler with edible offal.
9. Place inedible offal in offal cooler.
10. Clean work area and put away equipment.

JOB SHEETS 1-3

Development of:
READING SKILLS
MATHEMATICS SKILLS
SCIENCE SKILLS
EMPLOYABILITY SKILLS

- Introduce the assignment to the students by discussing why reading, mathematics, science, and employability skills are important.

- Discuss with them the following skills which are relevant to this task:

  READING SKILLS

  — Following written instructions

  MATHEMATICS SKILLS

  — Using English and metric measures

  — Making measurements

  SCIENCE SKILLS

  — Using scientific instrument (thermometer, scale)

  EMPLOYABILITY SKILLS

  — Mastering specific job task/procedure

  — Developing good work habits/attitudes

- If students have difficulty following written instructions:

  — Discuss the possible consequences of not following instructions precisely.

  — Have them read the instructions several times, noting the key words and ideas.

- If students have difficulty using English and metric measures:
  - Review units of measure in the English and metric systems.
  - Demonstrate and discuss the use of the units of measurement on the specific instruments.
- If students have difficulty making measurements:
  - Review the measurement system used.
  - Demonstrate the correct way to measure using the specific measuring instrument.
- If students have difficulty using scientific instruments (thermometer, scale):
  - Discuss their applications.
  - Demonstrate their use, including safety precautions.
- If students have difficulty mastering a specific job task/procedure:
  - Encourage them to become familiar with the entire procedure before they begin the work.
  - Have them watch proficient students complete the task.
- If students have difficulty developing good work habits/attitudes:
  - Discuss the role that good work habits and attitudes have in obtaining and retaining employment.
  - Discuss what behaviors and attitudes constitute good work habits.
  - Make sure the student knows what is expected of him or her.

JOB SHEET 1

LIVESTOCK SLAUGHTER

V

OBJECTIVE 13

Slaughter a hog.

INTRODUCTION

The purpose of this job sheet is to provide you with the opportunity to apply what you have learned about livestock slaughter by actually performing the step by step slaughter of a hog.

EQUIPMENT AND SUPPLIES

- Hog prepared for slaughter
- Livestock scales
- Stunning crate
- Stun gun
- Shackles/chain
- Scalding vat
- Blow torch
- Knives and steel
- Offal cart
- Gambrel
- Carcass scales
- Saw
- Flank spreaders

PROCEDURE

Functional Reading Skills

- Follow written instructions

1. Preheat scalding vat to between 135° and 160°F.
2. Weigh hog and record live weight.
3. Place hog in stunning crate and immobilize by placing electric probe to hog's forehead for approximately two seconds.
4. With hog lying on side, employ proper sticking procedure.
5. Hoist and allow sufficient time for bleeding.

Math Application Skills
- Use English and metric measures

Functional Math Skills
- Make measurements

General Science Skills
- Use scientific instruments (thermometer, scale)

Job Acquisition/ Development Skills
- Master specific job task/procedure
- Develop good work habits/attitudes

6. Immerse hog into scalding vat and scald until flank hairs pull out easily.
7. Remove and place on scraping table.
8. Remove dewclaws and toenails.
9. Scrape hair properly until carcass is clean.
10. Open skin on hind legs just above the site of the dewclaws and insert gambrel under both tendons and hoist.
11. Singe remaining bristles with blow torch. Rinse carcass with hot water.
12. Open throat and remove tongue.
13. Remove head at atlas joint and place on head tree.
14. Loosen esophagus and trachea and tie off esophagus.
15. Separate hams and remove penis.
16. Loosen anus and vagina and tie off.
17. Cut down the seam of the belly and remove viscera.
18. Remove liver, separate gall bladder, wash liver, and save.
19. Remove pluck, save heart and hanging tenderloin.
20. Split carcass down backbone and leave attached by two inches of soft tissue.
21. Face hams.
22. Wash, weigh, and tag carcass.
23. Insert flank spreaders, place carcass with edible offal in cooler.
24. Place inedible offal in offal cooler.
25. Clean area and put away equipment.

JOB SHEET 2

LIVESTOCK SLAUGHTER

V

OBJECTIVE 14

Slaughter a sheep.

INTRODUCTION

The purpose of this job sheet is to provide you with the opportunity to apply what you have learned about livestock slaughter by actually performing the step by step slaughter of a sheep.

EQUIPMENT AND SUPPLIES

- Sheep prepared for slaughter
- Livestock scales
- Stunning Crate
- Captive bolt gun
- Knives and steel
- Sheep rack
- Offal cart
- Carcass scales
- Saw

PROCEDURE

Functional Reading Skills
- Follow written instructions

Math Application Skills
- Use English and metric measures

Functional Math Skills
- Make measurements

1. Weigh sheep and record live weight.
2. Place lamb in stunning crate and immobilize with a captive bolt gun.
3. After placing lamb on sheep rack, stick and allow to bleed
4. Remove head at atlas joint.
5. Cut down front of front legs and back of hind legs and peel away skin.
6. Remove feet with hide at the break joint.
7. Separate pelt from fell by fisting from breast to cod.
8. Open neck, loosen and tie esophagus.
9. Tie hind legs and hang on the rail.

General Science Skills

- Use scientific instruments (scale)

Job Acquisition/ Development Skills

- Master specific job task/procedure
- Develop good work habits/attitudes

10. Continue fisting over flank and hind legs, then pull pelt down over shoulder and neck.

11. Remove reproductive organs:

    a. On rams and wethers, remove the penis at highest point.

    b. On ewes, loosen rectum and vagina and tie.

12. Open abdominal cavity, starting at cod or udder fat, remove viscera and place into offal tank.

13. Open diaphragm and remove pluck. Remember to remove, wash, and save the liver, heart, and diaphragm (hanging tenderloin).

14. Rinse out abdominal and thoracic cavities.

15. Weigh and tag carcass and place in cooler with edible offal.

16. Place inedible offal in offal cooler.

17. Clean area and put away equipment.

JOB SHEET 3

LIVESTOCK SLAUGHTER

V

OBJECTIVE 15

Slaughter a beef animal.

EQUIPMENT AND SUPPLIES

- Beef animal (preferably a steer or heifer) prepared for slaughter
- Livestock scales
- Stunning crate
- Captive bolt gun
- Knives and steel
- Skinning cradle
- Offal cart
- Carcass scales
- Gambrel
- Saw

PROCEDURE

Functional Reading Skills
- Follow written instructions

Math Application Skills
- Use English and metric measures

Functional Math Skills
- Make measurements

1. Weigh and record live weight of animal.
2. Place animal in stunning crate and immobilize by using captive bolt gun.
3. Properly stick and bleed animal.
4. Skin and remove head at atlas joint.
5. Skin front legs and forearm and remove shank at knee.
6. Lower animal to skinning crate, skin hind legs and remove shank at hock.
7. Open skin along ventral middle from point of stick to rectum or vagina.
8. Skin neck and sides.
9. Remove penis and open belly.

General Science Skills
- Use scientific instruments (scale)

Job Acquisition/ Development Skills
- Master specific job task/procedure
- Develop good work habits/attitudes

10. Cut through the brisket to the sternum, then continue down the neck to expose esophagus.

11. Remove sweetbread and tie off esophagus.

12. Insert gambrel at achilles tendon and hoist to convenient height to skin and remove tail.

13. Loosen and tie anus, then continue to hoist carcass while pulling the hide from back.

14. Remove viscera and place into offal cart. Wash and save liver as edible offal.

15. Cut diaphragm and remove pluck. Wash and save heart and diaphragm (hanging tenderloin) as edible offal.

16. Split carcass down backbone and raise to rail.

17. Score flanks at stifle joint to remove wrinkles in loin and trim blood vessels from the neck.

18. Wash carcass thoroughly with warm water.

19. Weigh and tag carcass, shroud, and place in cooler with edible offal.

20. Place inedible offal in offal cooler.

21. Clean area and put away equipment.

PRACTICAL TEST 1 — *LIVESTOCK SLAUGHTER* — *V*

JOB SHEET 1

Slaughter a hog.

Student's name ____________________ Date ____________

Evaluator's name ____________________ Attempt no. ______

Instructions: When you are ready to perform this task, ask your instructor to observe the procedure and complete this form. All items listed under "Process Evaluation" must receive a "Yes" for you to receive an overall performance evaluation.

PROCESS EVALUATION

Evaluator note: Write a check mark in the "Yes" or "No" blanks to designate whether or not the student has satisfactorily achieved each step in this procedure. If the student is unable to achieve this competency have the student review the materials and try again.

The student	Yes	No
1. Preheated scalding vat, weighed hog, and immobilized hog.	___	___
2. Stuck and hoisted hog for bleeding, scalded, and placed hog on scraping table.	___	___
3. Removed dewclaws and toenails, scraped hair, singed remaining hair, and rinsed carcass.	___	___
4. Opened throat, removed tongue and head, loosened esophagus and trachea, and tied off esophagus.	___	___
5. Separated hams and removed penis, loosened and tied off anus and vagina.	___	___
6. Removed offal and saved edible offal.	___	___
7. Split carcass and faced hams.	___	___
8. Prepared and stored carcass in cooler.	___	___
9. Cleaned area and put away equipment.	___	___

EVALUATOR'S COMMENTS

____

____

____

PRODUCT EVALUATION

Evaluator's note: Rate the student on the following criteria by circling the appropriate numbers. Each criterion must receive a rating of "3" or higher to demonstrate student mastery. (See performance evaluation key.) A student who is unable to demonstrate mastery should review the material and submit another product for evaluation.

Criteria:				
Preparation	4	3	2	1
Animal slaughter	4	3	2	1
Butchering	4	3	2	1
Storing carcass	4	3	2	1
Clean up	4	3	2	1

EVALUATOR'S COMMENTS

____

____

____

AVERAGE RATING

Evaluator note: To obtain an average rating for the competency profile, total the designated points in "Product Evaluation" and divide by the total number of criteria. Circle the rating of the "Performance Evaluation Key" below.

PERFORMANCE EVALUATION KEY

4 **Skilled** - Can perform job with no additional training
3 **Moderately Skilled** - Has performed job during training program; limited additional training may be required
2 **Limited skill** - Has performed job during training program; additional training is required to develop skill
1 **Unskilled** - Is familiar with process; is unable to perform the job

JOB SHEET 2

Slaughter a sheep.

Student's name ____________________ Date ____________

Evaluator's name ____________________ Attempt no ________

Instructions: When you are ready to perform this task, ask your instructor to observe the procedure and complete this form. All items listed under "Process Evaluation" must receive a "Yes" for you to receive an overall performance evaluation.

PROCESS EVALUATION

Evaluator note: Write a check mark in the "Yes" or "No" blanks to designate whether or not the student has satisfactorily achieved each step int this procedure. If the student is unable to achieve this competency, have the student review the materials and try again.

The student	Yes	No
1. Weighed, immobilized, and placed sheep on sheep rack. Stuck and bled.	___	___
2. Removed head, skin, and legs.	___	___
3. Removed pelt.	___	___
4. Removed reproductive organs.	___	___
5. Removed offal and saved edible offal.	___	___
6. Prepared and stored carcass in cooler.	___	___
7. Cleaned area and put away equipment.	___	___

EVALUATOR'S COMMENTS

____

____

____

PRODUCT EVALUATION

Evaluator note: Rate the student on the following criteria by circling the appropriate numbers. Each criterion must receive a rating of "3" or higher to demonstrate student mastery. (See performance evaluation key.) A student who is unable to demonstrate mastery should review the material and submit another product for evaluation.

Criteria:				
Preparation	4	3	2	1
Animal slaughter	4	3	2	1
Butchering	4	3	2	1
Storing carcass	4	3	2	1
Clean up	4	3	2	1

EVALUATOR'S COMMENTS

AVERAGE RATING

Evaluator note: To obtain an average rating for the competency profile, total the designated points in "Product Evaluation" and divide by the total number of criteria. Circle the rating on the "Performance Evaluation Key" below.

PERFORMANCE EVALUATION KEY

4 **Skilled** - Can perform job with no additional training
3 **Moderately Skilled** - Has performed job during training program; limited additional training may be required
2 **Limited skill** - Has performed job during training program; additional training is required to develop skill
1 **Unskilled** - Is familiar with process; is unable to perform the job

PRACTICAL TEST 3

LIVESTOCK SLAUGHTER

V

JOB SHEET 3

Slaughter a beef animal.

Student's name____________________ Date __________

Evaluator's name____________________ Attempt no._______

Instructions: When you are ready to perform this task, ask your instructor to observe the procedure and complete this form. All items listed under "Process Evaluation" must receive a "Yes" for you to receive an overall performance evaluation.

PROCESS EVALUATION

Evaluator note: Write a check mark in the "Yes" or "No" blanks to designate whether or not the student has satisfactorily achieved each step int this procedure. If the student is unable to achieve this competency, have the student review the materials and try again.

The student	Yes	No
1. Weighed and immobilized animal.	___	___
2. Stuck, hoisted, and bled animal.	___	___
3. Skinned and removed head. Skinned and removed forearms.	___	___
4. Placed animal on skinning crate. Skinned hind shank and removed.	___	___
5. Opened skin along ventral middle from point of stick to rectum or vagina. Removed penis and opened belly.	___	___
6. Cut through brisket to the sternum, removed sweetbread, cut and tied esophagus.	___	___
7. Hoisted animal and removed hide and tail. Loosened and tied anus.	___	___
8. Removed offal and saved edible offal.	___	___
9. Split carcass, raised to rail, scored flanks, and trimmed blood vessels from neck.	___	___

10. Prepared and stored carcass in cooler. ___ ___

11. Cleaned area and put away equipment. ___ ___

EVALUATOR'S COMMENTS

PRODUCT EVALUATION

Evaluator note: Rate the student on the following criteria by circling the appropriate numbers. Each criterion must receive a rating of "3" or higher to demonstrate student mastery. (See performance evaluation key.) A student who is unable to demonstrate mastery should review the material and submit another product.

Criteria:				
Preparation	4	3	2	1
Animal slaughter	4	3	2	1
Butchering	4	3	2	1
Storing carcass	4	3	2	1
Clean up	4	3	2	1

EVALUATOR'S COMMENTS

AVERAGE RATING

Evaluator note: To obtain an average rating for the competency profile, total the designated points in "Product Evaluation" and divide by the number of criteria. Circle the rating on the "Performance Evaluation Key" below.

PERFORMANCE EVALUATION KEY

4 **Skilled** - Can perform job with no additional training
3 **Moderately Skilled** - Has performed job during training program; limited additional training may be required
2 **Limited skill** - Has performed job during training program; additional training is required to develop skill
1 **Unskilled** - Is familiar with process; is unable to perform the job

Name ______________________ Score __________

OBJECTIVE 1

Match terms associated with livestock slaughter to their correct definitions. Write the correct letters in the blanks.

Part I

____ 1. The process of removing hair from swine by scalding the carcass in hot water (135° - 160°F for 3 to 4 minutes) until hair pulls out easily; carcass is then placed in a dehairing machine and/or scraped with a knife or bell scraper

____ 2. Removal of internal organs during slaughter including the heart, reproductive tract, respiratory and digestive systems

____ 3. The organs lying in the thoracic cavity, consisting of the heart, lungs, gullet, and windpipe

____ 4. The internal organs of an animal including the heart, digestive, respiratory, and reproductive systems

____ 5. The white tissue separating the hams or hind quarters, also the seam of the belly

____ 6. A thin, colorless, connective tissue membrane that separates the skin from the carcass

a. Bleeding or sticking
b. Stunning
c. Reproductive system
d. Dehairing or scalding
e. Bell scrape
f. Eviscerate
g. Pluck
h. Thoracic cavity
i. Offal
j. Symphysis
k. Fell
l. Viscera
m. Fisting

May be photocopied for student use.

Part II

_____ 1. Allowing an animal to bleed until death occurs by severing the carotid artery and jugular vein with a six to seven inch sticking knife

_____ 2. A method of skinning sheep by forcing the fist between the pelt and fell

_____ 3. Epiphyseal cartilage at the end of the metacarpal where the foot is removed during slaughter

_____ 4. Unbleached cheese cloth immersed in warm salt water and pinned over the outside of the warm beef carcass to absorb blood, smooth external fat, and cause fat to appear white and dense

_____ 5. A Hebrew word meaning "properly prepared" and is a method of slaughter performed by a rabbi or shohet on beef and sheep where the animal is bled without stunning

_____ 6. The organs of the abdominal cavity including the stomach, intestines, liver, kidneys, and reproductive tract

_____ 7. Fat in pelvic area around the kidney

_____ 8. A chemical change in an over excited animal which causes the meat to be darker than normal

a. Shroud

b. Fisting

c. Pelting

d. Break point

e. Leg joint

f. Carcass bag

g. Viscera

h. Kosher

i. Caul or leaf fat

j. Dark cutter

k. Abdominal cavity

l. Bleeding or sticking

m. Fell

May be photocopied for student use.

OBJECTIVE 2

Match livestock equipment to their uses. Write the correct letter in the blank.

Part I

_____ 1. Device placed between the meat hooks, which are inserted in the achilles tendons of hind shank, for hoisting

_____ 2. Device that holds the sheep on its back for sticking and skinning

_____ 3. Placed in carcass between back and flank to keep flank from rolling up

_____ 4. Scales used to weigh carcass

_____ 5. Large, usually portable, tank for collecting and transporting offal

_____ 6. Flame torch used to singe hair remaining after dehairing

_____ 7. A machine used, after scalding, to remove hair from hogs

_____ 8. Used to hoist animal for bleeding

_____ 9. Restraining device for immobilizing livestock

a. Dehairing machine
b. Shackles/chain
c. Blow torch
d. Gambrel
e. Carcass lift
f. Sheep rack
g. Flank spreaders
h. Holding crate
i. Carcass scales
j. Offal tank/cart
k. Hand torch
l. Gamble
m. Stunning crate
n. Meat hooks

Part II

_____ 1. Scales used to weigh livestock

_____ 2. Electric or captive bolt gun used to immobilize animal

a. Livestock scales
b. Splitter
c. Holding vat

May be photocopied for student use.

____ 3. Large container of hot water used to scald hogs until hair will slip off

____ 4. Any one of a number of different types of machines used to remove skin from animals

____ 5. Used for sticking, scraping, skinning, or boning meat; and a sharpening tool

____ 6. Device used to hoist carcass; inserted in achilles tendons on hind shank

____ 7. Used to cut bone, such as splitting the carcass

____ 8. Rack used to hold heads for inspection

d. Scalding vat

e. Carcass scales

f. Stun gun

g. Meat hooks

h. Knives and steel

i. Saw

j. Head tree

k. Skinning machine

l. Carcass tree

OBJECTIVE 3 **State procedures for preparing livestock for slaughter.**

____

____

____

____

____

May be photocopied for student use.

OBJECTIVE 4 **Match methods of immobilization to their correct description.** Write the correct letters in the blanks.

_____ 1. Employs a hand-held probe that is placed on the animal's forehead for one to four seconds, depending upon the weight of the animal. A five to seven second interval between stunning and sticking is recommended in order to avoid capillary rupture in the muscle, causing unsightly blood spots in the meat

_____ 2. Captive bold guns may be operated by air pressure or by blank cartridges with different powder loads for different sized animals. The penetrating type enters the skull while the concussion type delivers a blow to the skull by way of a mushroom head on the end of a captive bolt.

_____ 3. Employs a 65 to 75 percent concentration of carbon dioxide. The CO_2 gas, which is heavier than air, is held in a pit with a minimum loss of gas. Animals, normally hogs, ride in individual compartments down an incline into the chamber. The time of exposure to render the animal unconscious depends upon their size.

a. Air pressure

b. Chemical

c. Electrical

d. Mechanical

e. Capillary rupture

May be photocopied for student use.

OBJECTIVE 5

Describe types of sticking:

1. Hogs

____

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2. Sheep

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3. Cattle

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____

____

May be photocopied for student use.

OBJECTIVE 6 **Arrange in order the steps for dehairing hogs.** Write a "1" before the first step, a "2" before the second, and so on.

____ Raise carcass from scraping table and hang on the rail.

____ If a dehairing machine is not available, place carcass on scraping table. Remove dewclaws and toenails with hook.

____ With knife, open skin on hind legs just above the dewclaws and insert gambrel under both tendons.

____ Remove the carcass when flank hair pulls out easily (three-four minutes).

____ Prepare scalding vat with water at 135° to 160°F.

____ Rinse with hot water and shave any remaining hair.

____ Scrape the carcass with bell scraper or knife until clean.

____ With hog bled sufficiently and shackled by one hind leg, immerse into scalding vat and keep submerged and in motion.

____ Singe the remaining bristles with a blow torch.

OBJECTIVE 7 **Arrange in order the steps for skinning hogs.** Write a "1" before the first step, a "2" before the second, and so on.

____ Split skin from point of stick to jawbone and remove skin from jowl and neck just behind the ears.

____ Open skin down the back of the front and hind legs and down the middle of the belly.

____ After hog has bled sufficiently, place carcass on its back on a skinning rack.

____ With hog hoisted and tail loosened, the skin can be pulled off the back.

____ Remove dewclaws and toenails with hooks.

____ Very carefully, keeping the knife against the skin, remove skin from legs, then belly and sides.

____ Finish skinning the face, store the hide properly, and wash the carcass.

____ Loosen tendons on hind legs and insert gambrel and hoist hog.

May be photocopied for student use.

OBJECTIVE 8

Arrange in order the steps for eviscerating hogs. Write a "1" before the first step, a "2" before the second, and so on.

____ Remove all intestines to the diaphragm and cut esophagus at the cardia. Leave kidney and leaf fat in body cavity.

____ Split the carcass directly down the backbone but permit sides to remain attached by 2 inches of soft tissue.

____ Wash, weigh, and tag carcass.

____ Loosen esophagus and trachea and tie-off esophagus.

____ Place inedible offal in offal cooler.

____ Remove kidneys and leaf fat. Discard kidneys but save fat for lard.

____ Insert flank spreaders and roll carcass and edible offal into cooler.

____ Open throat from point of stick to jawbone and from point of stick to sternum.

____ Lift liver from the diaphragm and cut it loose. Remove gall bladder from liver, wash and save as edible offal.

____ Separate the hams at the symphysis pubis. Remove penis at the point of attachment near pubis.

____ Remove tongue, wash, and save as edible offal.

____ Loosen anus and vagina and tie off.

____ Face hams.

____ Clean area and put away tools.

____ Remove pluck and diaphragm (hanging tenderloin). Separate heart, wash and place with edible offal.

____ Remove head at the atlas joint, wash head, and place on head tree.

May be photocopied for student use.

OBJECTIVE 9

Arrange in order the steps for removing the pelt (skin) of sheep. Write a "1" before the first step, a "2" before the second and so on.

_____ Remove feet with the hide at the break joint.

_____ Open the neck from brisket to stick, loosen and tie the gullet and windpipe.

_____ Fist off pelt working from heart girth upward over flank and hind legs. Free pelt with knife at dock and pull down over shoulders and neck.

_____ Tie the hind legs together and hang on the rail to complete fisting.

_____ Begin fisting at brisket and tunnel through to cod or udder fat, freeing pelt on both sides.

_____ Grasp the hind leg and open the skin down to back of the leg form the hoof to a point just below the rectum.

_____ Grasp the front legs at the front foot or hoof and split the skin down the front of the leg form fetlock to a point just in front of the brisket. Repeat on the other front leg.

_____ After sheep has bled sufficiently, remove head at atlas joint.

OBJECTIVE 10

Arrange in order the steps for eviscerating sheep. Write a "1" before the first step, a "2" before the second and so on.

_____ Remove reproductive organs.

_____ Place inedible offal in offal cooler.

_____ Weigh, tag, and hang carcass in cooler with edible offal.

_____ Head was removed and esophagus tied during skinning.

_____ Open abdominal cavity, starting at cod or udder fat and keep viscera pushed back from knife with two fingers.

_____ Remove pluck and diaphragm (hanging tenderloin). Separate and wash heart and place it with edible offal.

_____ Clean area and put away equipment.

May be photocopied for student use.

____ Trim neck, rinse out abdominal and thoracic cavity, and tie foreshanks against forearm.

____ Remove viscera and place into offal tank being careful not to cut bladder. Remove, wash, and save liver.

OBJECTIVE 11

Arrange in order the steps for skinning a beef carcass. Write a "1" before the first step, a "2" before the second, and so on.

____ Loosen and tie anus, then continue to hoist carcass.

____ Skin both sides of neck and continue siding as far as possible.

____ Lower carcass to the skinning cradle.

____ After the animal has been thoroughly bled, skin head and remove at atlas joint. Remove tongue and place head on head tree for inspection.

____ Cut through the fat at the brisket to sternum. Continue down the neck to expose esophagus and trachea.

____ Remove the sweetbread and tie the esophagus.

____ Insert beef trollies at achilles tendons and hoist carcass to a convenient height to skin and remove tail.

____ Pull hide from back, apply salt, roll, and store properly.

____ Saw through the sternum.

____ Remove penis and open the belly down the symphysis.

____ Open the skin along ventral middle from stick to rectum or vagina.

____ Skin front leg by cutting all the way around pastern below dewclaws and opening hide along inside of the leg. Finish skinning shank and forearm and remove shank at smooth joint of the knee.

____ Skin hind legs similar to front leg, opening the skin along the back side of the leg to the cod or udder. Remove hind shank at enlargement of the hock.

May be photocopied for student use.

OBJECTIVE 12 **Arrange in order the steps for eviscerating a beef carcass.** Write a "1" before the first step, a "2" before the second, and so on.

_____ Place inedible offal in offal cooler.

_____ Cut diaphragm and remove pluck. Save heart and diaphragm (hanging tenderloin) as edible offal.

_____ Loosen anus and vagina and tie if not done during skinning.

_____ Save caul fat, save liver, and separate stomach from intestine (muscles from rumen are edible offal).

_____ Score flank at stifle joint to remove wrinkles in loin, trim blood vessels from the neck.

_____ Weigh and tag carcass, shroud, and place in cooler with edible offal.

_____ Clean work area and put away equipment.

_____ Split carcass down backbone. Raise carcass to rail.

_____ Wash carcass inside and out with warm water.

_____ Remove viscera and place into offal cart, leave kidney in the carcass.

NOTE: Objectives 13-15 are evaluated on job sheets/assignment sheets in this unit. If you have not completed these components, see your instructor.

May be photocopied for student use.

WRITTEN TEST ANSWERS | *LIVESTOCK SLAUGHTER* | *V*

OBJECTIVE 1

Part I	Part II
1. d	1. l
2. f	2. b
3. g	3. d
4. i	4. a
5. j	5. h
6. k	6. g
	7. i
	8. j

OBJECTIVE 2

Part I	Part II
1. d	1. a
2. f	2. f
3. g	3. d
4. i	4. k
5. j	5. h
6. c	6. g
7. a	7. i
8. b	8. j
9. m	

OBJECTIVE 3

Answers should include the following:

- Select only healthy animals in satisfactory condition.
- Keep the animal off feed for 24 hours prior to slaughter, but allow access to water.
- Weigh animal and record live weight in record book.

OBJECTIVE 4	1. c 2. d 3. b
OBJECTIVE 5	1. **Hogs** - Normally, the sticking is done with the hog lying on its side. A six inch sticking knife or seven inch knife for large hogs (400-600 lbs) should be inserted two inches in front of the breast with the point of the knife directed toward the tail. Give an upward trust, dipping the point until it strikes the backbone and then withdraw the knife. Raise hog from the floor with shackles around one hind leg. 2. **Sheep** - Normally, the sticking is done with the sheep lying on its back on a sheep rack. Grasp the jaw with the free hand, insert the knife behind the jaw, blade-edge outward, and draw the knife out through the pelt. 3. **Cattle** - (Standard method) Make an incision over the point of the brisket toward the jaw. Insert the knife in front of the brisket at a 45° angle and sever the carotid arteries and jugular vein.
OBJECTIVE 6	7, 4, 6, 3, 1, 9, 5, 2, 8
OBJECTIVE 7	5, 3, 1, 7, 2, 4, 8, 6
OBJECTIVE 8	7, 10, 13, 4, 15, 11, 14, 1, 8, 5, 2, 6, 12, 16, 9, 3
OBJECTIVE 9	4, 6, 8, 7, 5, 3, 2, 1
OBJECTIVE 10	2, 8, 7, 1, 3, 5, 9, 6, 4
OBJECTIVE 11	12, 6, 3, 1, 8, 9, 11, 13, 10, 7, 5, 2, 4
OBJECTIVE 12	9, 4, 1, 3, 6, 8, 10, 5, 7, 2

OBJECTIVE SHEET

QUALITY AND YIELD GRADING MEAT AND POULTRY PRODUCTS

VI

INTRODUCTION

To accurately judge the true market value of any meat carcass, you must be able to determine the yield of salable cuts and compute the quality grade. The federal government sets standards for quality and yield grading of meat and requires that all carcasses be graded. You must be able to apply these standards and accurately grade carcasses to work successfully in the meat industry.

UNIT OBJECTIVE

After completing this unit, the student will be able to quality grade beef, lamb, pork, and poultry carcasses and also yield grade beef carcasses. The student will demonstrate these competencies by completing the assignment sheets, job sheet, and written test with a minimum of 85 percent accuracy.

SPECIFIC OBJECTIVES

After completing this unit, the student will be able to

1. Match terms associated with yield and quality grading to their correct definitions.
2. Complete statements regarding the role of the federal government in grading and inspecting carcasses.
3. Select from a list factors that contribute to meat quality and customer satisfaction.
4. Arrange in order the degrees of marbling in a beef carcass.
5. Select from a list factors which affect quality grade.
6. Select from a list factors which affect yield grade.
7. Match pork carcass yields to their correct grades.
8. Select from a list true statements concerning how a pork carcass is measured for length and backfat thickness.
9. Match classes of lamb carcasses to their correct definitions.
10. Match definitions of poultry classes to their correct class.
11. List factors which affect the quality grading of poultry.
12. Determine the quality grade of beef carcasses. (Assignment Sheet 1)

13. Estimate within one-third yield grade the actual yield grade of a beef carcass. (Assignment Sheet 2)

14. Determine the carcass grade of pork carcasses. (Assignment Sheet 3)

15. Estimate the quality grade of lamb carcasses. (Assignment Sheet 4)

16. Determine the gender and class of a beef carcass. (Job Sheet 1)

PREPARATION

- Obtain materials to supplement unit.

  NOTE: See Suggested Resources.

- Review instructional outline for this unit. Modify time frames to suit class needs and plan activities for each class period.
- Study specific objectives to determine those you will cover in your presentation. Decide which objectives should be taught to which students.
- Determine scope and sequence of objectives that you add. Design and develop support materials, including evaluation techniques, for additional objectives.
- Determine how you will schedule time for students to demonstrate competence in the required procedures.
- Make arrangements for guest speakers. Supply speakers with specific objectives and other appropriate sections of the unit.
- Make arrangements to visit a local slaughter house.
- Obtain a beef carcass for use with Job Sheet 1.
- Prepare classroom
  - Put up posters, charts and other items dealing with quality and yield grading.
  - Have articles, brochures, and other literature dealing with quality and yield grading available for students.

DELIVERY

Objective 1

- Review terms with class.

Objective 2

- Invite a federal meat grader to the classroom to discuss the role of meat graders in today's meat industry.

  NOTE: Provide guest speaker with specific objectives ahead of time to allow the speaker time to prepare.

- Allow students to read sections of USDA grading standards from the official USDA grading pamphlet.

Objective 3

- Allow students to visually appraise both high quality and low quality meat cuts.

Objective 4

- Show students the set of marbling score pictures from the National Live and Stock Meat Board.

- Collect slides or photographs of different marbling scores to allow the students to practice determining marbling scores.

- Either collect samples of rib eyes with various marbling scores or take students to the meat counter in a supermarket to estimate marbling scores.

Objective 5

- Show quality grading videos.

- Use Supplements 1-4 to show students how factors affect quality grade.

Objective 6

- Prepare practice sheets giving the basic information for determining yield grade and have students work the practice sheets.

- Use Supplement 5 to show students how factors affect yield grade.

- Arrange for students to visit a slaughter house to practice yield grading.

Objective 7

- Show students carcasses and determine muscling score and carcass grade.

- Use Supplement 6 to assist students in determining carcass grades of pork.

Objective 8

- Show students carcasses to point out grading standards and measure carcass length and backfat thickness.

Objective 9

- Show students carcasses to explain quality factors in lamb carcasses.
- Gather break and spool joints from different age carcasses to show students variations.
- Use Supplement 7 to assist students in matching lamb carcasses to their correct definition.

Objectives 10 and 11

- Present poultry carcasses to students to demonstrate age variations and quality grade.
- Use Supplement 8 to show students the specifications for quality of Ready-to-Cook Poultry.

APPLICATION

Objective 12

- Use Assignment Sheet 1 to give students practice in determining the quality of a beef carcass.
- Collect ribs, spinal processes, and sections of backbones from various-aged carcasses so students can practice age determination.
- Show quality grading videos.
- Take students to a slaughter house to age a variety of carcasses.

Objective 13

- Use Assignment Sheet 2 to give students practice in estimating the actual yield grade of a beef carcass.

Objective 14

- Use Assignment Sheet 3 to give students practice in determining the carcass grade of pork carcasses.

Objective 15

- Use Assignment Sheet 4 to give students practice in estimating the quality grade of lamb carcasses.

Objective 16

- Have students complete Job Sheet 1.

EVALUATION

Practical Test

- Explain to students that they will be asked to demonstrate procedures on the job sheets to complete the practical test.
- Describe the rating scale used in the practical test.
- Give practical test.
- Reteach and retest as necessary.

Written Test

- Explain to students that they will be asked to demonstrate on the written test actions listed in the specific objectives.
- Give the written test.

  NOTE: The written test may be given in sections if desired.
- Evaluate students on assignment sheet activities if not previously done.
- Reteach and retest if necessary.
- Complete appropriate section of competency profiles.
- Review individual and group performance in order to evaluate teaching methods. Adjust scope, sequence, or instructional approaches for additional lessons as required.

SUGGESTED RESOURCES

Electronic Media

- *Marbling Photographs*, National Live Stock and Meat Board. 444 North Michigan Avenue, Chicago, IL 60611. To place order by phone: Outside of Illinois call 1-800-368-3138, in Illinois call (312) 670-9440 or (312) 670-9441 weekdays between the hours of 8:15 and 4:30 Central Standard (or Daylight) Time.
- The following videos are available from Creative Educational Videos, P. O. Box 65265, Lubbock, TX 79464, (800) 922-9965.

  Beef Quality Grading. Principles of maturity scores and percent ossification are used to teach quality grading. (24 minutes, color, VHS)

  Beef Yield Grading. This video explains how to estimate the PYG, REA, and KPH and calculate preliminary yield grade and advanced yield grade. (21 minutes, color, VHS)

Introduction to Poultry Judging. This video introduces the student to the poultry industry and career opportunities within the industry. Handling and grading poultry, terminology, and poultry parts are also covered in this video. (20 minutes, color, VHS)

Practice Beef Quality Grading. Fifty practice carcasses with varying maturity and marbling are shown for student evaluation. After every ten carcasses, official grading information is presented. (33 minutes, color, VHS)

Practice Beef Yield Grading. Carcasses with varying yield grades (from 1.0 to 5.6) are shown for evaluation. Official grading information is provided after the presentation of each class. (33 minutes, color, VHS)

Print Media

- *Meat Evaluation Handbook National Live Stock and Meat Board*, 444 North Michigan Avenue, Chicago, Illinois 60611.
- Levie, Albert, *Meat Handbook*, 4th ed., Van Nostrand Reinhold Company, Inc., New York, 1979.
- Romans, John R., Costello, Carlson, Jones, and Ziegler, *The Meat We Eat*, Interstate Printers and Publishers, Inc., Danville, Illinois, 1985.
- *USDA Grading Standards Pamphlet*, Available from the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402.
- *Poultry Grade Manual*, Agricultural Marketing Service, USDA, Agriculture Handbook #31, Standardization Branch, Poultry Division, AMS, USDA, Room 3944-South, P.O. Box 96456, Washington, D.C. 20090.

UNIT REFERENCES

- *Meat Evaluation Handbook*, National Live Stock and Meat Board, 444 North Michigan Avenue, Chicago, Illinois 60611.
- Levie, Albert, *Meat Handbook*, 4th ed., Van Nostrand Reinhold Company, Inc., New York, 1979.
- Romans, John R., Costello, Carlson, Jones, and Ziegler, *The Meat We Eat*, Interstate Printers and Publishers, Inc., Danville, Illinois, 1985.
- *USDA Grading Standards Pamphlet*, Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402.

- *Poultry Grade Manual*, Agricultural Marketing Service, USDA, Agriculture Handbook #31, Standardization Branch, Poultry Division, AMS, USDA, Room 3944-South, P.O. Box 96456, Washington, D.C. 20090.
- *Meat Processing Plant Employee*, Vocational Instructional Services, Texas A & M University, College Station, Texas, 1985.

INFORMATION SHEET

QUALITY AND YIELD GRADING MEAT AND POULTRY PRODUCTS *VI*

OBJECTIVE 1

Match terms associated with yield and quality grading to their correct definitions.

- **Aitch bone** — front part of the pelvic girdle that attaches to the backbone
- **Break joint** — region in the cannon bone above the spool joint where growth occurs, mostly cartilage
- **Cervical** — refers to the neck
- **Chine bone** — blade-like bone that extends upward from the vertebrae
- **Cod** — scrotal area of a male carcass
- **Connective tissue** — tough, chewy fibers present in meat that hold muscle fibers together and attach muscles to bone
- **Cutability** — term describing the yield of closely trimmed, major retail cuts from a carcass
- **Lean** — muscle fibers that make up the edible portion of meat
- **Lumbar** — lower back area of the carcass, from the pelvic area up to the last rib
- **Marbling** — small specks of fat found inside the muscles

  NOTE: This intramuscular fat is important in making meat tender and flavorful
- **Ossification** — process of cartilages gradually changing to bone as the animal ages
- **Palatability** — degree to which food tastes good
- **Pizzle eye** — small ring located at the rear-most portion of the pelvic bone where the penis muscle is attached
- **Pizzle muscle** — penis retractor muscle, attached to the pelvic girdle
- **Sacral** — refers to the base of the tail and the part of the backbone in the pelvis

- **Spool joint** — bottom end of the cannon bone
- **Thoracic** — refers to the area of the body that contains the heart and lungs

OBJECTIVE 2 **Complete statements regarding the role of the federal government in grading and inspecting carcasses.**

Due to the many variations in animal carcasses and changes in consumer preferences, a need was recognized for the federal government to establish basic grading standards for the meat industry. In 1916, the USDA established tentative standards for grades of beef. Since then, most classes of meat species have been added.

Because of changes in consumer preference and industry technology, grading standards have been revised many times. Although grading is entirely voluntary and paid for by the processor, consumer demands require that the majority of carcasses be graded.

Anyone with a financial interest in the meat can ask that it be graded. Graded meat is stamped with a harmless, indelible ink to certify the official grade of the carcass.

To protect the public, all animal carcasses and the plants they are processed in are inspected during slaughter to determine the wholesomeness of the carcass. If the carcass is found to be diseased, contaminated with some substance known to be unhealthy, or contains parasites that are harmful to humans, the carcass is condemned.

Inspection is mandatory. Meat inspection is supervised by the USDA and paid for by fees collected from the meat packers.

OBJECTIVE 3 **Select from a list factors that contribute to meat quality and customer satisfaction.**

Carcasses are graded according to factors that not only apply to palatability but also to customer buying habits. The following factors determine consumer preference in buying meat:

- **Color** — Consumers invariably buy brightly colored meat that contains firm, white fat.

  Note: Meat is usually very dark when it is first cut. When exposed to oxygen in the air, it changes to the cherry red color preferred by the consumer. With more exposure to the air, it then takes on a brown color that most consumers find objectionable. Neither the dark color nor the brown color has any effect on meat flavor or quality, but both affect the marketing of the product. Some of the larger packers are experimenting with a program to retail meat that is packaged in air-tight plastic immediately after fabrication. This packaging extends the shelf-life of the product, but the consumer will have to be educated as to the reasons why this is preferable.

- **Percentage of lean meat** — Buyers prefer a high percentage of lean and little bone or fat in a retail cut.
- **Package size** — Family size and smaller portions contribute to customer satisfaction.
- **Firmness** — Customers select meat that is firm and not weeping.
- **Marbling** — Some consumers favor meat that contains a generous amount of intermuscular fat or marbling.

Consumer satisfaction is also influenced by the palatability of the meat.

These elements determine palatability:

- **Tenderness** — Age, genetics, and ration determine meat tenderness.
- **Flavor** — The amount of marbling regulates taste.
- **Meat juice** — Marbling and the animal's diet influence meat juiciness.
- **Texture** — Coarseness of the muscle fiber is influenced by the age of the carcass and the animal's gender.

OBJECTIVE 4

Arrange in order the degrees of marbling in the beef carcass.

Certain amounts of marbling or intermuscular fat are necessary in order for the meat to be palatable. The USDA assigns nine different degrees of marbling and provides photographs illustrating the lower limits of each class as standards. The nine classes in descending order of quantity of marbling are as follows:

Abundant (Ab)
Moderately abundant (MA)
Slightly abundant (SA)
Moderate (Md)
Modest (Mt)
Small (Sm)

Slight (Sl)
Traces (Tr)
Practically devoid (PD).

To determine the degree of marbling one must visually appraise the rib eye at the twelfth thoracic vertebra. To do this the carcass side must be cut or "ribbed." A cut is made perpendicular to the length of the carcass in the center of the twelfth vertebra. After the vertebra is completely sawed, a knife cut is made across the rib eye slightly upward between the twelfth and thirteenth ribs. The rib eye muscle, thus exposed, is visually appraised to determine the degree of marbling.

OBJECTIVE 5 **Select from a list factors which affect quality grade.** (Assignment Sheet 1)

Consumers prefer meat that is wholesome, attractive, and flavorful. Grading standards have been established that determine which carcasses have these preferred characteristics. Some of the factors that affect the quality of meat include:

Carcass Age — The older the animal is, the lower the quality of the meat. Older animals are tougher, their meat is darker, and flavors are usually stronger.

Gender — Males that are mature and not castrated have objectionable flavors. They are tougher and the meat is usually coarser in texture.

Amount of fat — Fat is an important consideration in determining quality since animals with too little fat are tough and tasteless, while too much fat is wasteful.

Color — Consumers show a marked preference for meat that is bright in color because they associate it with freshness. Meat that is off-color is graded down in quality.

Wholesomeness — Government inspection of carcasses ensures the meat bought by the consumer is free from disease, parasites, and contamination from anything that might be considered a health hazard.

OBJECTIVE 6 **Select from a list factors which affect yield grade.** (Assignment Sheet 2)

Carcasses exhibit large variations in muscling and fat trim, therefore the value varies greatly from carcass to carcass. Because of this variation in value, carcasses are graded according to their yield. Yield grades are variations in cutability or yield of boneless, closely trimmed retail cuts from the loin, rib, round, and chuck.

A good way to visualize yield grade is to imagine cutting a carcass up into piles of lean meat, fat, and bone. A carcass which exhibited a higher percentage of lean meat as compared to fat and bone, would have a smaller yield grade number than a carcass which had a higher percentage of fat and bone.

Yield grades are divided into five classifications from 1 to 5 with lean carcasses classified as 1, and fat carcasses classified as 5. In determining yield grade, there are four significant factors to consider:

- Carcass weight
- Area of the rib eye muscle
- Amount of external fat
- Amount of internal or kidney, heart, and pelvic fat

OBJECTIVE 7

Match pork carcass yields to their correct grades.
(Assignment Sheet 3)

Pork carcasses are divided into five classes: barrow, gilt, sow, stag, and boar. As in beef carcasses, evidence of sexual characteristics such as pizzle eye and mammary system are the distinguishing factors between classes. Grading standards for slaughter barrows and gilts are based upon lean quality and yield of the four major wholesale cuts (ham, loin, picnic, and Boston butt).

Two categories are set for the quality of lean: acceptable and unacceptable. These categories are determined by evaluating the firmness of the fat and lean, amount of feathering between the ribs, and the color of the lean. Barrow and gilt carcasses with unacceptable quality are graded U.S. Utility. Carcasses which have soft and/or oily fat are also graded U.S. Utility. Very few carcasses are graded Utility. Since most carcasses are acceptable, carcass yield is the determining factor as to carcass grade. Acceptable carcasses are separated into four grades: U.S. No. 1, U.S. No.2, U.S. No. 3 and U.S. No. 4, which are based upon average backfat thickness and muscling. If standard methods of cutting and trimming carcasses are used, the four grades will yield the following:

GRADE	YIELD
• U.S. No. 1	60.4% and over
• U.S. No. 2	57.4% to 60.3%
• U.S. No. 3	54.4% to 57.3%
• U.S. No. 4	Less than 54.4%

OBJECTIVE 8

Select from a list true statements concerning how a pork carcass is measured for length and backfat thickness.

- Length is measured in inches from the forward edge of the aitch bone to the forward edge of the first rib near the cervical vertebrae.
- Carcass length ranges from 28 to 32 inches on 200-240 pound hogs.
- Backfat thickness is measured at the last rib over the backbone in inches.
- If there is a great variation in fat thickness along the carcass, adjustments should be made to compensate.
- All measurements are rounded to the nearest .1 of an inch and the skin is added into the measurement. If a carcass has been skinned, .1 of an inch is added to the backfat thickness.

OBJECTIVE 9

Match classes of lamb carcasses to their correct definitions.

In order to determine the value of a lamb carcass, age and those factors which influence meat quality must be evaluated.

Sheep carcasses are divided according to age using three classes: lamb, yearling mutton, and mutton. Age can be determined by looking at the break joints and spool joints on the front shanks.

- **Lamb** — Carcass has round, narrow ribs which are red and porous, easily broken break joints, and lean which is fine textured and bright.
- **Yearling Mutton** — Carcass has slightly wide and flat ribs, with either break or spool joints, and slightly coarser textured lean.
- **Mutton** — Carcass has wide, flat ribs which are flinty and white, spool joints, and coarse textured lean.

While dressing sheep carcasses the foot and pastern are removed at the ankle. The exposed end of the cannon bone is called a spool joint. Above the spool joint is a region where the growth in the cannon bone occurs. Since this region is mostly cartilage in young animals and can be easily broken, it is called the break joint. This region ossifies as the animal matures so it is used as a method to age carcasses.

Rams are discounted on quality grade depending on their sexual maturity. Young carcasses which have not developed thick, heavy necks and shoulders are not discounted. However, as these characteristics develop, the quality grade is lowered progressively until, in mature rams, the quality grade may be dropped as much as two quality grades.

Carcass age is a very important factor in considering carcass value because mature mutton has a distinctive flavor and drier, coarser lean, which most people in this country do not like. This consumer preference dictates a large price break between lambs and mutton.

OBJECTIVE 10 **Match definitions of poultry classes to their correct class.**

Chickens

- **Rock Cornish Game Hens** — A five to six week old immature chicken weighing less than two pounds, ready-to-cook weight, which is of Cornish breeding.
- **Rock Cornish Fryer, Roaster or Hen** — Cornish breed chickens, of no special weight, which have age or other characteristics that qualify them for this class.
- **Broiler or Fryer** — A young chicken (usually less than 13 weeks of age and of either sex) that is tender-meated, with soft, pliable, smooth textured skin, and flexible cartilage in the breastbone.
- **Roaster or Roasting Chicken** — A young chicken (under five months of age and of either sex) that is tender-meated, with soft, pliable, smooth textured skin and breastbone cartilage that is much less flexible than a broiler.
- **Capon** — A surgically castrated male chicken (usually under eight months of age) that is tender-meated with soft, pliable, smooth textured skin.
- **Hen, Fowl, or Baking or Stewing Chicken** — A mature female (over 10 months of age) with less tender meat than a roasting chicken and a non-flexible breastbone.
- **Cock or Rooster** — A mature male chicken with coarse skin, tough and darkened meat, and a hard breastbone tip.

Turkeys

NOTE: All classifications denote both sexes.

- **Fryer/Roaster Turkey** — A young turkey (usually under 16 weeks of age) that is tender-meated, with soft, pliable skin, and flexible breastbone cartilage.
- **Young Turkey** — A turkey under eight months of age that is tender-meated with soft, pliable, smooth textured skin that has a breastbone which is noticeably less pliable.
- **Yearling Turkey** — A mature turkey under 15 months of age that is reasonably tender-meated with reasonably smooth textured skin.
- **Mature Turkey** — A mature turkey over 15 months of age with coarse skin and toughened flesh.

Ducks

- **Broiler or Fryer Duckling** — A duck under eight weeks of age, of either sex, that is tender-meated and has a soft bill and windpipe.
- **Roaster Duckling** — A duck under 16 weeks of age, of either sex, that has a bill that is not completely hardened and a windpipe that is easily dented.
- **Mature Duck** — A duck over six months of age with tough flesh, hard bill, and windpipe.

Geese

- **Young Goose** — A young goose that is tendered-meated and has a windpipe that is easily dented.
- **Mature Goose** — A goose of either sex that has toughened flesh and a hard windpipe.

Guineas

- **Young Guinea** — A guinea that is tender-meated and has a flexible breastbone.
- **Mature Guinea** — An older guinea of either sex that has toughened flesh and a hardened breastbone.

Pigeons

- **Squab** — A young, immature pigeon.
- **Pigeon** — A mature bird with coarse skin and tough flesh.

OBJECTIVE 11 **List factors which affect the quality grading of poultry.**

Since most poultry is processed by machinery, mistakes in slaughter are a large determining factor in carcass quality. The areas that have to be appraised in quality determination are the following:

- **Conformation** — The carcass should be free of deformities that detract from its appearance or that affect the normal distribution of flesh.
- **Fleshing** — The carcass should have a well-developed covering of flesh.
- **Fat Covering** — The carcass should have a well-developed layer of fat in the skin.
- **Defeathering** — The carcass should be free of pinfeathers, hairs, and diminutive feathers.
- **Exposed Flesh** — The carcass should be free from exposed flesh resulting from cuts made during processing.
- **Disjointed or Broken Bones** — There should not be any bones broken during processing.
- **Discolorations of the Skin and Flesh** — Carcass should be almost free of bruises and evidence of incomplete bleeding, especially on the breast and legs.
- **Freezing Defects** — Carcass should be free of defects caused by improper freezing of parts.

DETERMINING GENDER AND CLASS OF BEEF CARCASSES

Several factors are considered in determining the quality grade of beef carcasses. Two of these factors are gender and class. Bull beef is not quality graded and separate standards exist for steer, heifer, and cow beef and yet another for bullock beef. Also, cow beef is not eligible to be graded Prime and bullock beef is not eligible for the Commercial, Utility, and Cutter grades.

For these reasons, it is important to be able to determine the gender of a carcass and recognize the characteristics which will enable you to place it in its proper class.

Carcasses can be sexed quite easily by considering the following criteria:

- **Male** — distinguished by the presence of a rough, irregular area of fat in the cod, a pizzle eye, pizzle muscle, a jump muscle above the aitch bone and, in the case of bulls, a noticeable crest in the neck region.

- **Female** — distinguished by an udder, a relatively large pelvic cavity, and the absence of a pizzle eye or pizzle muscle.

Beef carcasses are divided into five classes:

- **Steer** — a male castrated prior to sexual maturity, carcass characterized by rough, irregular fat in the cod region, small pizzle eye, a curved aitch bone and the typical lean area above the aitch bone called the jump muscle or bald spot.

- **Bullock** — young bull identified by meat that is relatively coarse and dark red in color, smaller amounts of fat, a larger pizzle eye, and usually a noticeable crest.

- **Bull** — mature bull (C or greater maturity) as determined by skeletal development with the same general characteristics as a bullock.

- **Heifer** — young female identified by a slightly larger pelvic cavity and a straighter aitch bone than a steer, very smooth fat around the udder, and usually the udder is retained with the carcass.

- **Cow** — mature female (C or greater maturity) characterized by a large pelvic cavity, nearly straight aitch bone, and the udder is usually removed from the carcass.

DETERMINING QUALITY GRADE OF BEEF CARCASSES

Once gender and class have been determined, steer, heifer, and cow carcasses are evaluated for maturity, marbling, and meat firmness to establish a quality grade. Remember that cow beef is not eligible to be graded as Prime and that bullock carcasses can not be graded as Commercial, Utility, or Cutter.

The maturity of a carcass is determined by evaluating the size, shape, and ossification of the bones and cartilages and the color and texture of the lean. Generally, as an animal matures, the cartilage caps of the chine bones gradually ossify starting with the sacral (tailhead) vertebrae, progressing to the lumbar region, and finally affecting the thoracic (shoulder) vertebrae. Also, as the animal ages, the ribs flatten and widen out and lose their porous, red texture. The lean coarsens in texture and darkens in color as the animal ages.

Carcasses are given an age score with A being the youngest animals which exhibit bright red, porous chine bones with soft cartilage caps. These carcasses, which are approximately nine to thirty months old, exhibit bright red lean with round ribs which are soft and porous. The age score ends with E maturity carcasses which have fused sacral and lumbar vertebrae, completely ossified thoracic vertebrae, very wide and flat ribs, and extremely dark, coarse-textured lean.

Each age score is also subdivided into three subscores: high, average and low. These subscores are designated by the superscripts: $^{-}$, $^{\circ}$, $^{+}$ after the age score. Using maturity group A for example, the youngest 33 percent of the carcasses in age group A are designated A^{-}. The middle 33 percent would be A° and the oldest third would be designated A^{+}.

The degree of marbling is determined by visually inspecting the amount of intramuscular fat in the rib eye between the twelfth and thirteenth rib. Illustrations of the lower limits of marbling are available from the United States Department of Agriculture.

Only after one has successfully determined the marbling score and the maturity grade of a particular carcass can the quality grade be determined. A and B maturity carcasses are divided into four quality grades: Prime, Choice, Select, and Standard. Prime carcasses are those having slightly abundant or greater degrees of marbling. Choice carcasses are those having slight to small degree of marbling.

A and B carcasses are divided into four quality grades:

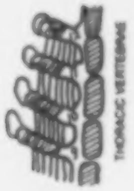
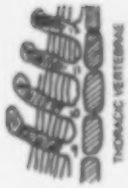
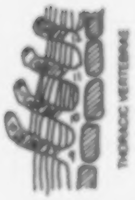
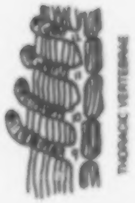
Grade	Amount of Marbling
Prime	Slightly abundant or greater
Choice	Moderate to Slight
Select	Slight or Traces
Standard	Traces or Practically Devoid

Maturity grades C, D, and E are broken down into three grades:

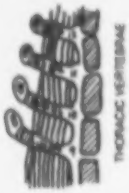
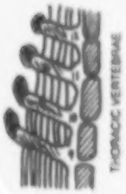
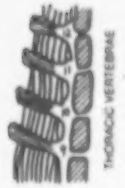
- Commercial
- Utility
- Cutter

Generally, the higher the maturity score, the greater the amount of marbling required to attain a higher grade. Looking at the chart "Relationship Between Marbling, Maturity, and Carcass Quality Grade" in Supplement 4, you can see that an A° carcass would require a small degree of marbling to be graded Choice while a B^+ carcass would require a modest degree of marbling to be graded the same.

TABLE OF MATURITY DESCRIPTIONS OF BEEF ANIMALS

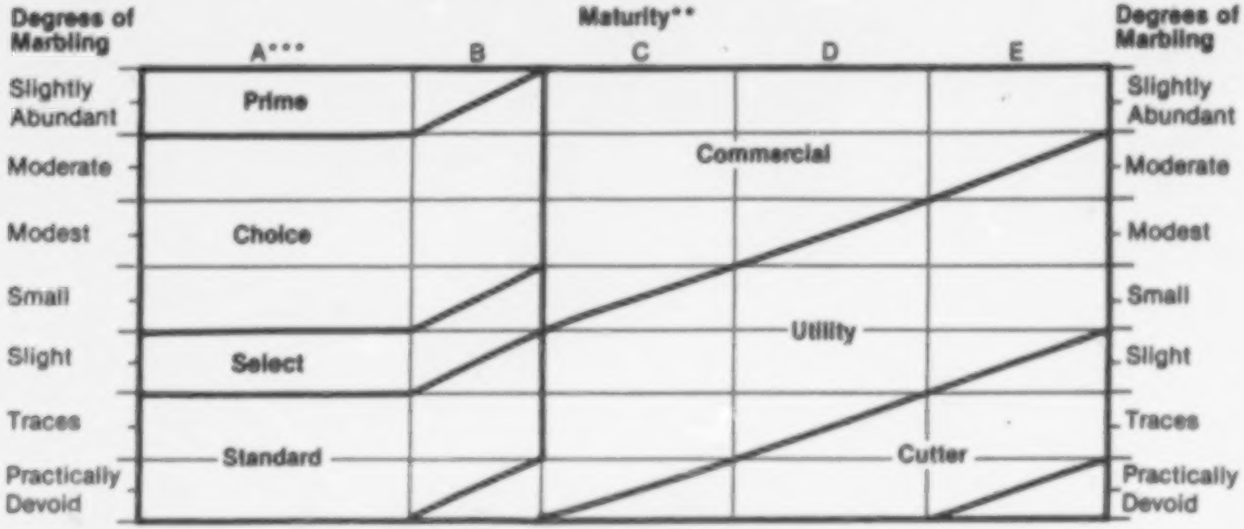
Approximate Chronological Age	Maturity Group	Vertebral Ossification			Ribs	Rib-Eye Muscle
		Sacral	Lumbar	Thoracic		
9-10 Months	A - 	*Distinct Seperation*	*Cartilage evident* on all vertebrae	*Cartilages evident* on all vertebrae; soft, porous, and very red chine bones	Slight tendency toward flatness	Light grayish in color; very fine in texture
30 months	A+/B 	Completely fused	*Nearly completey ossified*	*Cartilages have some evidence* of ossification; slightly red and slightly soft *chine bones*	Slightly wide; slightly flat	Light red in color; fine in texture
42-48 Months	B + 	Completely fused	Completely ossified	*Cartilages partially ossified;* chine bones tinged with red	Slightly wide; slightly flat	Tends to be fine in texture
42-48 months	C - 	Completely fused	Completely ossified	*Cartilages moderately* (20%-30%) ossified; chine bones tinged with red	Slightly wide; slightly flat	Tends to be fine in texture

Romans, Jones, Costello, Carlson, and Ziegler, *The Meat We Eat*, Interstate Publishers, Inc. 1985. Used by permission.

Approximate Chronological Age	Maturity Group	Vertebral Ossification			Ribs	Rib-Eye Muscle
		Sacral	Lumbar	Thoracic		
60-70 Months	C+/D- 	Completely fused	Completely ossified	*Cartilages show* considerable ossification but outlines are plainly visible; moderately hard, rather white chine bones	Moderately wide and flat	Moderately dark in color; slightly coarse in texture
Older	D+/E- 	Completely fused	Completely fused	*Cartilages barely* visible; hard,white chine bones	Wide and flat	Dark red and coarse textured
Oldest	E+ 	Completely fused	Completely fused	Completely fused	Very wide and flat	Very dark red and coarse texture

Romans, Jones, Costello, Carlson, and Ziegler, *The Meat We Eat*, Interstate Publishers, Inc. 1985. Used by permission.

Relationship Between Marbling, Maturity, and Carcass Quality Grade*



*Assumes that firmness of lean is comparably developed with the degree of marbling and that the carcass is not a "dark cutter."

**Maturity increases from left to right (A through E).

***The A maturity portion of the Figure is the only portion applicable to bullock carcasses.

ESTIMATING THE YIELD GRADE OF A BEEF CARCASS

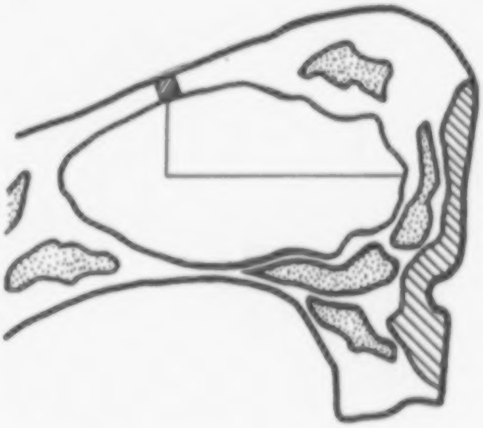
The yield grade is determined by the mathematical equation:

Yield Grade = 2.50 + (2.50 X Adjusted Fat Thickness, Inches) + (0.20 X Percent Kidney, Heart, and Pelvic Fat) + (0.0038 X Hot Carcass Weight, Pounds) - (0.32 X Area of Rib Eye, Square Inches)

Grading many carcasses using this method is cumbersome and time-consuming. A faster method is used to approximate the yield grade as follows:

1. The first step is to determine a "preliminary yield grade" by estimating the fat thickness at the last rib. This is measured on the outside fat of the rib-eye muscle two-thirds of the way down from the chine bone. This estimate is made to the nearest one-tenth of an inch and used to get a preliminary yield grade (PYG) following this chart:

THICKNESS OF FAT OVER THE RIB EYE (INCHES)	PRELIMINARY YIELD GRADE
.2	2.5
.4	3.0
.6	3.5
.8	4.0
1.0	4.5
1.2	5.0
1.4	5.5



2. The next step is to adjust the PYG according to the heaviness of muscling of the carcass by determining the size of the rib eye muscle in square inches at the thirteenth rib and comparing it to the average for a carcass with the same hot weight. A carcass with a hot carcass weight of 600 pounds should average a rib-eye muscle of 11.0 square inches. For every increase of twenty-five pounds of carcass weight, the rib eye should increase .3 square inches in area. Thus, a carcass weighing 700 pounds should have a rib eye of 12.2 square inches. Here is a chart of average rib-eye areas:

HOT CARCASS WEIGHT	AREA OF RIB EYE (SQUARE INCHES)
400	8.6
425	8.9
450	9.2
475	9.5
500	9.8
525	10.1
550	10.4
575	10.7
600	11.0
625	11.3
650	11.6
675	11.9
700	12.2

Once the rib-eye area for a certain carcass weight is determined, then find the difference between actual and average rib-eye area.

Rib-eye area can be measured in two different ways. The quickest method is to visually estimate the rib-eye muscle area in square inches. This requires some experience in estimating and is obviously not too accurate. The most accurate technique is to use a clear plastic sheet with dots laid out in a grid pattern. This grid is placed directly on the rib eye. By counting the dots, each of which denotes .1 square inches, the actual rib-eye area can be measured.

If the difference is positive or the actual rib-eye area is larger than average, then subtract .3 of a grade from the PYG for each 1.0 square inch. If the difference is negative, then add .3 of a grade to the PYG for each 1.0 square inch of rib-eye area.

For example, if a particular carcass had a PYG of 2.5, a hot carcass weight of 615 pounds and a rib-eye area of 11.6, then the average rib eye of a carcass this size should be 11.1. Therefore, this carcass has a .5 inch larger than normal rib eye. By subtracting .15 from the PYG of 2.5, the corrected PYG of 2.35 is derived.

3. The final adjustment is to compensate for variation in the internal or kidney, heart, and pelvic fat (KHP). On average, a carcass contains 3.5 percent KHP fat. For every 1 percent of KHP greater than 3.5, add .2 to the PYG. For every 1 percent less than 3.5, subtract .2 from the PYG. This estimate of KHP fat is determined by visual appraisal of the carcass. This adjustment denotes the final yield grade.

Examples of working an entire problem would be as follows:

A hot carcass weighing 690 lbs with a rib-eye area estimated at 16.6 square inches, an estimated KHP fat of 2.0 percent and a fat thickness over the loin of .4 inches would have a PYG of 3.0. Because a carcass weighing 690 lbs would, on average, have a loin eye of 12.1, the PYG would be adjusted downward 1.35 yield grade (16.6 - 12.1 = 4.5 sq. in. x .3 = 1.35). From this adjusted PYG, further adjustment would be considered because of the low KHP fat. Since this carcass has 1.5 percent lower than normal KHP, the PYG would be adjusted downward by .3 of a yield grade (1.5% x .2 = .3). The final yield grade would be 1.35.

An unusually fat carcass weighing 552 lbs with a rib eye area measured with a grid at 9.5 sq. in., KHP fat of 4.5 percent, and a fat thickness at the thirteenth rib of 1.0 in. would have a PYG of 4.5. A carcass with a hot weight of 552 lbs averages 10.4 square inches of rib eye. Since this carcass only measures 9.5, the PYG must be adjusted upward to 4.8 (9.5 - 10.4 = -.9 x .3 = -.3). Since the KHP fat is also more than normal, the PYG is again adjusted upward (3.5 - 4.5 = 1.0 x .2 = .2). The final yield grade is 4.5 + .3 + .2 = 5.0.

Determining the yield grade is one of the most important grading skills. A mistake of one grade can mean a difference of many dollars in value. As in most grading skills, yield grading can only be mastered through hard work, attention to details, and lots of practice.

DETERMINING THE CARCASS GRADE OF PORK CARCASSES

Only two criteria determine the carcass grade of pork, the backfat thickness and the degree of muscling. Unlike backfat thickness, which is simply measured, muscling must be visually estimated. Carcasses are graded according to the degree of muscling into three different classes, thick (superior), average and thin (inferior). Muscling is visually estimated by comparing the thickness of the ham to the loin, depth of the chine, and by considering fat thickness. Superior muscled carcasses that have a small fat thickness will be much thicker through the hams than the loins and the loins will appear full and well-rounded. If the fat thickness increases, hams will still be slightly thicker than the loins, and the chine will be thicker than average. Inferior muscled carcasses will be thicker through the shoulder than any other point on the body and the loins will appear sloping and flat. If they are fat, there will be a distinct break over the loins into the side, and they will have a smaller lumbar lean area than average.

Barrow and gilt carcass grades are calculated by the following formula:

Carcass Grade = (4.0 x Backfat Thickness Over the Last Rib) - (1.0 x Muscling Score)

In this equation, thick muscling is given a score of 3, average is given a 2, and thin is given a 1. In the final grade all fractions are dropped, not rounded up.

Another method of determining carcass grade is to determine a preliminary carcass grade based on backfat thickness and then to adjust the grade according to the degree of muscling.

PRELIMINARY GRADE	BACKFAT THICKNESS
U.S. No. 1	Less than 1 in.
U.S. No. 2	1.00 to 1.24 in.
U.S. No. 3	1.25 to 1.49 in.
U.S. No. 4	1.50 and over

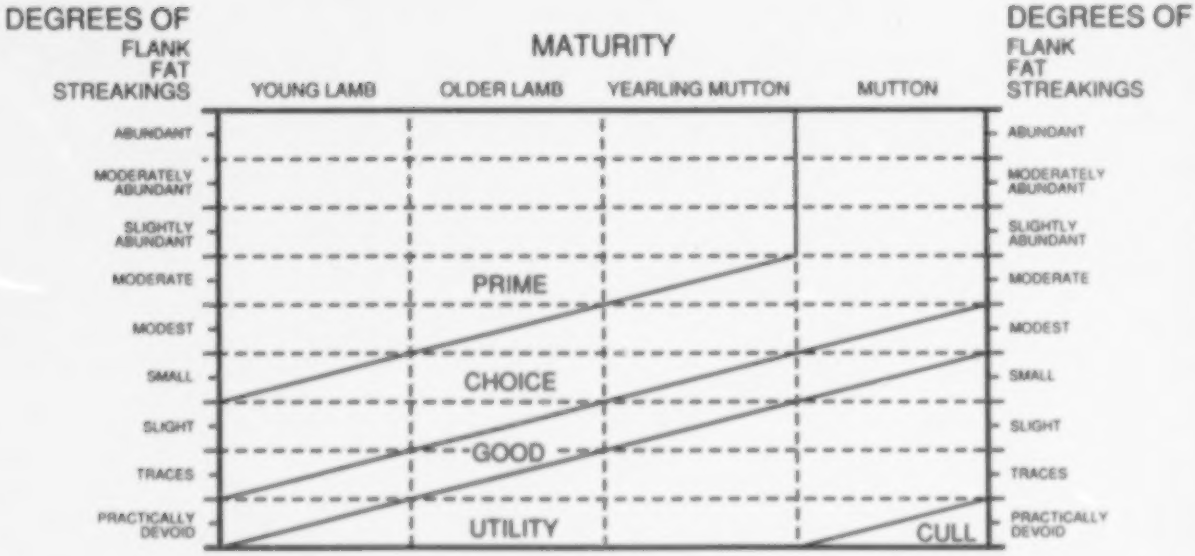
After the preliminary grade is determined, thick muscled carcasses are graded up one grade and thin muscled carcasses are graded down one grade. Average muscled carcasses will not be adjusted from the preliminary grade.

For example, a carcass which was appraised as being thick muscled and had a fat thickness at the last rib of 1.1 inches would be a U.S. No. 1 because the superior muscling raises the grade by one. Conversely, a carcass which had a fat thickness of 1.1 inches but was only appraised as thin muscled would be considered a U.S. No. 3 because of the discount for being thin muscled.

DETERMINING THE QUALITY GRADE OF LAMB CARCASSES

In quality grading lamb carcasses that have been ribbed, marbling, texture, and color of the rib eye are the most important criteria. However, most carcasses are generally left unribbed so the grading must be done by visually examining the exterior of the carcass. Since the flank is usually the best area to appraise, it should be of desirable bright pink color indicative of a young carcass. Fat should be white and firm over the body and should feather or streak the abdominal cavity and the thoracic area. The quality of the lean is almost exclusively determined by evaluation of the fat streakings in the inside flank muscle in relation to evidence of maturity and conformation. The relationship between flank fat streakings, maturity, and quality is shown in the table below.

There are four quality grades for each maturity class. Lamb and yearling mutton carcasses are classified as Prime, Choice, Good, or Utility. Mutton carcasses are classified as Choice, Good, Utility, or Cull.



In addition, a minimum degree of lean and external fat firmness is specified for each grade, regardless of maturity. These are: Prime-tends to be moderately firm; Choice-tends to be slightly firm; Good-slightly soft; and Utility (mutton only)-soft. These requirements are applicable only to the quality aspects of the grade and do not reflect any compensations for superior or inferior conformation.

Ready-to Cook Poultry

Summary of Specifications for Standards of Quality for Individual Carcasses and Parts

(Not All Inclusive)

(Minimum Requirements and Maximum Defects Permitted)

Factor		A Quality			B Quality			C Quality
Conformation:		Normal			Moderate deformities			Abnormal
Breastbone		Slight curve or dent			Moderately dented, curved or crooked			Seriously curved or crooked
Back		Normal (except slight curve)			Moderately crooked			Seriously crooked
Legs and Wings		Normal			Moderately misshapen			Misshapen
Fleshing:		Well fleshed, moderately long, deep and rounded breast			Moderately fleshed, considering kind, class and part			Poorly fleshed
Fat Covering:		Well covered -- especially between heavy feather tracts on breast, and considering kind, class and part			Sufficient fat on breast and legs to prevent distinct appearance of flesh through the skin			Lacking in fat covering over all parts of carcass
Defeathering:								
Nonprotruding pins and hair		Free			Few scattered			Scattering
Protruding pins		Free			Occasional			Occasional
Exposed Flesh: Carcass Weight **Minimum**	**Maximum**	**Breast and Legs**	**Elsewhere**[1]	**Part**	**Breast and Legs**[1]	**Elsewhere**[1]	**Part**	
None	**2 lbs.**	None	1"	Slight	1/3 of flesh exposed on each part on carcass provided meat yield not appreciably affected		1/3 of flesh exposed - meat yield not appreciably affected	No limit
Over 2 lbs.	**6 lbs.**	None	1 1/2"	trim on				
Over 6 lbs.	**16 lbs.**	None	2"	edge				
Over 16 lbs.	**None**	None	3"					
Discolorations:[3]								
None	**2 lbs.**	3/4"	1 1/4"	1/4"	1 1/4"	2 1/4"	1/2"	No limit[4]
Over 2 lbs.	**6 lbs.**	1"	2"	1/4"	2"	3"	1"	
Over 6 lbs.	**16 lbs.**	1 1/2"	2 1/2"	1/2"	2 1/2"	4"	1 1/2"	
Over 16 lbs.	**None**	2"	3"	1/2"	3"	5"	1 1/2"	
Disjointed and Broken Bones:		Carcass-- 1 disjointed and no broken Parts-- none			Carcass-- 2 disjointed and no broken or 1 disjointed and 1 nonprotruding broken Parts-- may be disjointed, no broken			No limit
Missing Parts: (Whole carcass only)		Wing tips and tail[5]			Wing tips, 2nd wing joint and tail Back area not wider than base of tail and extending half-way between base of tail and hip joints			Wing tips, wings and tail Back area not wider than base of tail extending to area between hip joints
Freezing Defects: (Consumer packaged)		Slight darkening on back and drumstick. Overall bright appearance. Occasional pockmarks due to drying. Occasional small areas showing layer of clear or pinkish ice			May lack brightness. Few pockmarks due to drying. Moderate areas showing layer of clear pinkish, or reddish colored ice			Numerous pockmarks and large dried areas

[1] Maximum aggregate area of all exposed flesh due to cuts, tears, and missing skin. In addition, carcass may have cuts or tears that do not expand or significantly expose flesh, provided the total aggregate length does not exceed the permitted tolerance for the weight range.

[2] For purposes of definition, the parts of the carcass shall be each wing, leg, entire back, and entire breast with each permitted to have one-third of the flesh exposed by cuts, tears, and missing skin.

[3] Flesh bruises and discolorations such as "blue back" are not permitted on breast and legs of A quality carcass or on these individual parts. Not more than one-half of total aggregate area of discolorations may be due to flesh bruises or "blue back" (when permitted) and skin bruises in any combination.

[4] No limit on size and number of areas of discoloration and flesh bruises if such areas do not render any part of the carcass unfit for food.

[5] In ducks and geese, the parts of the wing beyond the second joint may be removed, if removed at the joint and both wings are so treated. Tail must be removed at base.

(Effective June 9, 1986)

*U.S. Government Printing Office : 1990 - [illegible]

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ASSIGNMENT SHEET 1

Development of:
READING SKILLS
MATHEMATIC SKILLS

- Introduce the assignment to the students by discussing why reading and math skills are important.
- Discuss with them the following skills which are relevant to this task:

  READING SKILLS

  — Using in-book references

  MATHEMATIC SKILLS

  — Calculating with fractions

  — Calculating with decimals

- If students have difficulty using in-book references:

  — Review Supplement 4.

  — Discuss the relationship between references and the assigned material.

- If students have difficulty calculating with fractions, review basic skills for working with fractions.
- If students have difficulty calculating with decimals:

  — Review basic skills for working with decimals.

  — Remind them that our money system is a decimal system.

ASSIGNMENT SHEET 1

QUALITY AND YIELD GRADING MEAT AND POULTRY PRODUCTS

VI

Name ______________________________ Score ____________

OBJECTIVE 12

Determine the quality grade of beef carcasses.

Objective 4 deals with visually estimating marbling scores and Objective 5 discusses factors which affect quality grade. Once maturity and marbling scores have been determined, a final quality grade must be assigned using a grading table. The following exercise will emphasize this skill.

Below are simulated age and marbling scores for carcasses. Use the grading table in Supplement 4 to determine quality grade.

MATURITY SCORE	MARBLING SCORE	QUALITY GRADE
1. A°	Moderate	____________
2. B^{-}	Slightly Abundant	____________
3. C^{+}	Modest	____________
4. E^{-}	Slight	____________
5. A^{+}	Slight	____________
6. B^{-}	Slight	____________
7. B^{+}	Slight	____________
8. B°	Traces	____________
9. A°	Practically Devoid	____________
10. D^{-}	Modest	____________
11. D^{+}	Modest	____________
12. E^{-}	Moderate	____________
13. E^{+}	Moderate	____________
14. C^{-}	Practically Devoid	____________
15. D^{-}	Traces	____________

Research and Reference Skills

- Use in-book reference tools (tables of content, appendices, glossary, index, etc.)

Operation and Calculation Skills

- Calculate with fractions
- Calculate with decimals

ASSIGNMENT SHEET 2

Development of:
MATHEMATICS SKILLS
CREATIVE THINKING AND PROBLEM SOLVING SKILLS

- Introduce the assignment to the students by discussing why mathematics and creative thinking and problem solving skills are important.

- Discuss with them the following skills which are relevant to this task:

  MATHEMATICS SKILLS

  - Estimating answers
  - Calculating with whole numbers
  - Calculating with decimals
  - Solving numerical expressions
  - Solving formulae and equations
  - Selecting/applying math formula
  - Solving ratio problems
  - Applying algebra principles
  - Solving practical problems

  CREATIVE THINKING AND PROBLEM SOLVING SKILLS

  - Transferring knowledge/training to new situations

- If students have difficulty estimating answers, review the principles of estimating.

- If students have difficulty calculating with whole numbers, review basic addition, subtraction, multiplication, and division.

- If students have difficulty solving numerical expressions, formulae and equations, or selecting/applying math formula:
    - Instruct the students to reword the problem in a form that is clearer to them.
    - Review the symbols used in math.
- If students have difficulty solving ratio problems, review the principles of ratio.
- If students have difficulty solving practical math problems, instruct them to find the key elements of the problem.
- If students have difficulty applying algebra principles, review the principles of basic algebra.
- If students have difficulty transferring knowledge or training to new situations:
    - Assist the student in comparing the procedures for similar tasks.
    - Encourage them to review basic procedures for each task.
- For additional suggestions on teaching basic skills, refer to Instructional Supplement 1.

ASSIGNMENT SHEET 2

QUALITY AND YIELD GRADING MEAT AND POULTRY PRODUCTS VI

Name ____________________ Score __________

OBJECTIVE 13

Estimate within one-third yield grade the actual yield grade of a beef carcass.

Operation and Calculation Skills
- Estimate answers
- Calculate with whole numbers
- Calculate with decimals
- Solve numerical expressions
- Solve formulas & equations

Math Application Skills
- Select/apply mathematical formula
- Solve ratio/proportion problems

Functional Math Skills
- Solve practical problems

Cognitive Activities Skills
- Transfer knowledge/training to new situations

Objective 6 lists factors which affect yield grade. However, the most difficult part of determining yield grade is remembering the formula and calculating the math. This activity provides practice in doing the math part of yield grading.

The exercises below will help you to develop the math skills needed for working yield grade problems. You can refer to Supplement 5 for additional information about yield grading. You will be allowed to look at the formula for the first set of problems, but must do the second set on your own.

Part I

Work the following yield grade problems using the formula below:

Yield Grade = 2.50 + (2.50 x Adjusted Fat Thickness, Inches) + (0.20 x Percent Kidney, Heart, and Pelvic Fat) + (0.0038 x Hot Carcass Weight, Pounds) - (0.32 x Area of Rib Eye, Square Inches)

ADJUSTED FAT THICKNESS	CARCASS WEIGHT	AREA OF RIB EYE	PERCENT KPH FAT	FINAL YIELD GRADE
1. .4"	825#	14.2 sq.in.	3.5%	______
2. .7"	525#	9.0 sq.in.	5.0%	______
3. .5"	655#	15.0 sq.in.	4.0%	______
4. 1.4"	557#	10.3 sq.in.	5.7%	______
5. .6"	970#	16.5 sq.in.	3.0%	______
6. .1"	821#	12.0 sq.in.	1.5%	______

Problem 1 has been worked below:

1. 2.50 + (2.50 x .4") + (.20 x 3.5%) + (0.0038 x 825) - (0.32 x 14.2")

   2.50 + 1.00 + .70 + 3.14 - 4.54 = 2.80

Part II

Work the following yield grade problems without looking at the formula.

ADJUSTED FAT THICKNESS	CARCASS WEIGHT	AREA OF RIB EYE	PERCENT KHP FAT	FINAL YIELD GRADE
1. .4"	810#	14.1 sq.in.	3.5%	________
2. .2"	845#	17.1 sq.in.	2.0%	________
3. .5"	415#	8.1 sq.in.	4.0%	________
4. 1.5"	682#	12.1 sq.in.	6.0%	________
5. .6"	540#	13.2 sq.in.	4.0%	________
6. .3"	425#	9.0 sq.in.	3.0%	________
7. .6"	604#	15.0 sq.in.	3.5%	________
8. .2"	602#	10.3 sq.in.	2.5%	________
9. .7"	762#	12.1 sq.in.	4.5%	________
10. 1.0"	702#	11.3 sq.in.	4.5%	________

ASSIGNMENT SHEET 3

Development of:
MATHEMATICS SKILLS

- Introduce the assignment to the students by discussing why mathematics skills are important.
- Discuss with them the following skills which are relevant to this task:

MATHEMATICS SKILLS

— Calculating with whole numbers

— Calculating with decimals

— Solving formulae and equations

— Selecting/applying math formula

— Solving ratio problems

— Applying algebra principles

— Solving practical problems

— Interpreting charts

- If students have difficulty interpreting charts, review the purpose of the chart and define the elements.
- For additional suggestions on teaching basic skills, refer to Instructional Supplements 1 and 2.

ASSIGNMENT SHEET 3

QUALITY AND YIELD GRADING MEAT AND POULTRY PRODUCTS VI

Name ______________________ Score __________

OBJECTIVE 14

Operation and Calculation Skills
- Calculate with whole numbers
- Calculate with decimals
- Solve formulae & equations

Math Application Skills
- Select/apply mathematical formula
- Solve ratio/proportion problems
- Apply algebra principles

Data Analysis and Display Skills
- Interpret charts & tables

Functional Math Skills
- Solve practical problems

Determine the carcass grade of pork carcasses.

Objective 7 deals with matching pork carcass yields to their correct grades. The following exercise will emphasize this skill.

Part I

Using the backfat measurements and the muscling scores for the following pork carcasses, calculate a final carcass grade. The preliminary carcass grade table is shown below. You may refer to Supplement 6 for more information on carcass grading.

PRELIMINARY GRADE	BACKFAT THICKNESS
U.S. No. 1	Less than 1 in.
U.S. No. 2	1.00 to 1.24 in.
U.S. No. 3	1.25 to 1.49 in.
U.S. No. 4	1.50 and over

BACKFAT THICKNESS	MUSCLING SCORE	CARCASS GRADE
1. 1.15"	Thick	________
2. 1.30"	Thin	________
3. 1.45"	Average	________
4. 1.20"	Thin	________
5. .80"	Thick	________
6. 1.45"	Thick	________
7. 1.60"	Thin	________
8. 1.26"	Thick	________
9. 1.10"	Average	________
10. 1.55"	Thick	________

Part II

Now use the equation method to determine the final grade for the following pork carcasses.

Carcass grades are figured by the following formula:

Carcass Grade = (4.0 x Backfat Thickness
Over the Last Rib) - (1.0 x Muscling Score)

In this equation, thick muscling is given a score of 3, average is given a 2, and thin is given a 1. In the final grade all fractions are dropped, not rounded up.

BACKFAT THICKNESS	MUSCLING SCORE	CARCASS GRADE
1. 1.15"	Average	
2. 1.45"	Thick	
3. 1.30"	Average	
4. 1.10"	Thick	
5. 1.45"	Thin	
6. 1.25"	Thick	
7. 1.35"	Average	
8. 1.35"	Thin	
9. 1.20"	Thick	
10. 1.48 "	Thick	

ASSIGNMENT SHEET 4

Development of:
READING SKILLS
CREATIVE THINKING AND PROBLEM SOLVING SKILLS

- Introduce the assignment to the students by discussing why reading and creative thinking and problem solving skills are important.

- Discuss with them the following skills which are relevant to this task:

  READING SKILLS

  — Using in-book references

  — Interpreting graphics and symbols

  CREATIVE THINKING AND PROBLEM SOLVING SKILLS

  — Drawing conclusions

- If students have difficulty interpreting graphics and symbols:

  — Examine the structure of the graphics.

  — Review the meanings of symbols used.

  — Explain that graphics and symbols are visual representations of factual information.

- If students have difficulty drawing conclusions, have them review the information.

- For additional suggestions on teaching basic skills, refer to Instructional Supplements 1 and 2.

ASSIGNMENT SHEET 4

QUALITY AND YIELD GRADING MEAT AND POULTRY PRODUCTS

VI

Name ______________________________ Score______________

OBJECTIVE 15

Research and Reference Skills
- Use in-book reference tools (tables of content, appendices, glossary, index, etc.)

Functional Reading Skills
- Interpret graphics & symbols (charts, diagrams, graphs, signs, etc.)

Cognitive Activities Skills
- Draw conclusions

Estimate the quality grade of lamb carcasses.

Objective 9 deals with determining the age of lamb carcasses. Once a maturity score has been determined, a quality grade can be assigned based on the maturity score and flank fat streakings.

Estimate the quality grade of the following carcasses using the table in Supplement 7.

FLANK STREAKINGS	MATURITY SCORE	QUALITY GRADE
1. Moderate	Young Lamb	________
2. Slightly Abundant	Older Lamb	________
3. Traces	Yearling Mutton	________
4. Slightly Abundant	Mutton	________
5. Small	Older Lamb	________
6. Modest	Young Lamb	________
7. Practically Devoid	Older Lamb	________
8. Moderately Abundant	Mutton	________
9. Modest	Yearling Mutton	________
10. Traces	Mutton	________

ASSIGNMENT SHEET 1

1. Choice
2. Prime
3. Commercial
4. Utility
5. Select
6. Select
7. Standard
8. Standard
9. Standard
10. Commercial
11. Utility
12. Commercial
13. Utility
14. Utility
15. Utility

ASSIGNMENT SHEET 2

Part I

1. 2.80
2. 4.37
3. 2.24
4. 5.96
5. 3.01
6. 2.33

Part II

1. 2.77
2. 1.14
3. 3.54
4. 6.17
5. 2.63
6. 2.86
7. 2.20
8. 2.49
9. 4.17
10. 4.95

ASSIGNMENT SHEET 3

Part I

1. U.S. No. 1
2. U.S. No. 4
3. U.S. No. 3
4. U.S. No. 3
5. U.S. No. 1
6. U.S. No. 2
7. U.S. No. 4
8. U.S. No. 2
9. U.S. No. 2
10. U.S. No. 3

Part II

1. U.S. No. 2
2. U.S. No. 2
3. U.S. No. 3
4. U.S. No. 1
5. U.S. No. 4
6. U.S. No. 2
7. U.S. No. 3
8. U.S. No. 4
9. U.S. No. 1
10. U.S. No. 2

ASSIGNMENT SHEET 4

1. Prime
2. Prime
3. Utility
4. Choice
5. Choice
6. Prime
7. Utility
8. Choice
9. Choice
10. Utility

JOB SHEET 1

Development of:
READING SKILLS
CRETIVE THINKING AND PROBLEM SOLVING SKILLS
EMPLOYABILITY SKILLS

- Introduce the assignment to the students by discussing why reading, creative thinking and problem solving, and employability skills are important.
- Discuss with them the following skills which are relevant to this task:

  READING SKILLS

  - Following written instructions
  - Using in-book references

  CREATIVE THINKING AND PROBLEM SOLVING SKILLS

  - Analyzing/synthesizing information

  EMPLOYABILITY SKILLS

  - Mastering specific job tasks/procedures

- If students have difficulty following written instructions:
  - Discuss the possible consequences of not following instructions precisely.
  - Have them read the instructions several times, noting the key words and ideas.
- If students have difficulty analyzing/synthesizing information:
  - Discuss the fact that analyzing means breaking the information down into all its components for examination.
  - Discuss the fact that synthesizing means to reassemble the information in a way that makes the information clear and usable to the student.

  - Review procedures used in grading meat and poultry products.
  - Urge the student to organize their thoughts and then state them aloud.
- For additional suggestions on teaching basic skills, refer to Instructional Supplements 1-4.

Name ______________________ Score__________

OBJECTIVE 16 **Determine the gender and class of a beef carcass.**

INTRODUCTION Determining the class of a beef carcass is the first step in learning to estimate yield and carcass grade. Supplement 1 provides information on how different standards are used to judge each class of beef carcass.

EQUIPMENT AND SUPPLIES

- Beef carcass

PROCEDURE

1. Check carcass for the presence or absence of pizzle muscle and pizzle ring.
2. Check the cod area for rough, irregular fat in the case of a male or much smoother fat in the case of a female.
3. Check area ventral to the aitch bone. The amount of lean exposed in this area is much smaller in heifer and cow carcasses.

PROCEDURE

1. Check the size of the pizzle eye. The pizzle eye is relatively large in the carcasses of bullocks and bulls.
2. Check the size, color and texture of the pizzle muscle. The pizzle muscle is relatively large, dark red in color, and has a course texture in the carcasses of bullocks and bulls.
3. Check for the presence or absence of a crest indicating the carcass of a bull or bullock.
4. Check for the development of the jump muscle in carcasses with small amounts of exterior fat. The jump muscle will be more developed in the carcasses of bulls and bullocks.

PROCEDURE

1. Check the condition of the pelvic cavity and the aitch bone. Cow carcasses will have a relatively large pelvic cavity and the aitch bone will be nearly straight.
2. Check for the presence or absence of an udder. The udder will usually be present in heifer carcasses and will usually be removed from cow carcasses.

Functional Reading Skills

- Follow written instructions

Research and Reference Skills

- Use in-book reference tools (tables of content, appendices, glossary, index, etc.)

Cognitive Activities Skills

- Analyze/synthesize information

Job Acquisition/ Development Skills

- Master specific job/task procedure

JOB SHEET 1

Determine gender and class of beef carcass.

Student's name ______________________ Date ____________

Evaluator's name ______________________ Attempt no. ______

Instructions: When you are ready to perform this task ask your instructor to observe the procedure and complete this form. All items listed under "Process Evaluation" must receive a "Yes" for you to receive an overall performance evaluation.

PROCESS EVALUATION

Evaluator note: Write a check mark in the "Yes" or "No" blanks to designate whether or not the student has satisfactorily achieved each step in this procedure. If the student is unable to achieve this competency, have the student review the materials and try again.

The student:	Yes	No
1. Checked carcass for the presence or absence of a pizzle muscle and pizzle ring.	____	____
2. Checked cod area for rough, irregular fat.	____	____
3. Checked area ventral to the aitch bone for amount of exposed lean.	____	____
1. Checked size of the pizzle eye.	____	____
2. Checked size, color and texture of the pizzle muscle.	____	____
3. Checked for the presence or absence of a crest.	____	____
4. Checked for the development of the jump muscle.	____	____
1. Checked the condition of the pelvic cavity and the aitch bone.	____	____
2. Checked for the presence or absence of an udder.	____	____

EVALUATOR'S COMMENTS

____

____

____

PRODUCT EVALUATION

Evaluator note: Rate the student on the following criteria by circling the appropriate numbers. Each criterion must receive a rating of "3" or higher to demonstrate student mastery. (See Performance Evaluation Key.) A student who is unable to demonstrate mastery should review the material and submit another product for evaluation.

Criteria:

Determined gender of a carcass	4	3	2	1
Determined class of a carcass	4	3	2	1

EVALUATOR'S COMMENTS

____

____

____

AVERAGE RATING

Evaluator note: To obtain an average rating for the competency profile, total the designated points in "Product Evaluation" and divide by the total number of criteria. Circle the rating on the "Performance Evaluation Key" below.

PERFORMANCE EVALUATION KEY

4 **Skilled** - Can perform job with no additional training

3 **Moderately Skilled** - Has performed job during training program; limited additional training may be required

2 **Limited Skill** - Has performed job during training program; additional training is required to develop skill

1 **Unskilled** - Is familiar with process, but is unable to perform job

WRITTEN TEST

QUALITY AND YIELD GRADING MEAT AND POULTRY PRODUCTS

VI

Name ______________________ Score __________

OBJECTIVE 1

Match terms associated with yield and quality grading to their correct definitions. Write the correct letters in the blanks.

Part I

_____ 1. The area of the body that contains the heart and lungs

_____ 2. Term describing the yield of closely trimmed, retail major cuts from a carcass

_____ 3. Scrotal area of a male carcass

_____ 4. Front part of the pelvic girdle that attaches to the backbone

_____ 5. Muscle fibers that make up the edible portion of meat

_____ 6. Small ring located at the rear-most portion of the pelvic bone where the penis muscle is attached

_____ 7. Refers to the neck

_____ 8. Degree to which food tastes good

_____ 9. Process of cartilages gradually changing to bone as the animal ages

a. Lean

b. Palatability

c. Cod

d. Choice

e. Cervical

f. Throat

g. Thoracic

h. Lung cavity

i. Flavor

j. Aitch bone

k. Ossification

l. Pizzle eye

m. Cutability

May be photocopied for student use.

Part II

____ 1. Lower back area of the carcass, from the pelvic area up to the last rib

____ 2. Tough, chewy fibers present in meat that hold muscle fibers together and attach muscles to bone

____ 3. Penis retractor muscle, attached to the pelvic girdle

____ 4. Refers to the base of the tail and the part of the backbone in the pelvis

____ 5. Region in the cannon bone above the spool joint where growth occurs, mostly cartilage

____ 6. Bottom end of the cannon bone

____ 7. Small specks of fat found inside the muscles

____ 9. Blade-like bone that extends upward from the vertebrae

a. Sacral
b. Connective tissue
c. Ligaments
d. Hip bones
e. Marbling
f. Backfat
g. Lumbar
h. Chine bone
i. Spiral joint
j. Break joint
k. Spool joint
l. Pizzle muscle

OBJECTIVE 2

Complete statements regarding the role of the federal government in grading and inspecting carcasses. Write the correct answers in the blanks.

1. The federal government established tentative grading standards for beef in the year ____________________
2. Meat inspection is paid for by ____________________
3. Graded meat is identified by ____________________
4. Changes in grading standards happen periodically because of ______________________________

May be photocopied for student use.

OBJECTIVE 3

Select from a list factors that contribute to meat quality and customer satisfaction. Place an "X" in the blank before each correct answer.

____ 1. Composition

____ 2. Tone

____ 3. Color

____ 4. Odor

____ 5. Texture

____ 6. Firmness

____ 7. Yield

____ 8. Gender

____ 9. Marbling

____ 10. Location

____ 11. Percentage of lean meat

____ 12. Class

____ 13. Day of the week

____ 14. Package size

____ 15. Muscling

____ 16. Tenderness

____ 17. Time of the day

____ 18. Flavor

____ 19. Meat juice

May be photocopied for student use.

OBJECTIVE 4

Arrange in order the degrees of marbling in a beef carcass. Write a "1" in front of the term describing the most marbling, a "2" in front of the second, and so on.

_____ Moderate

_____ Practically devoid

_____ Traces

_____ Slightly abundant

_____ Small

_____ Moderately abundant

_____ Abundant

_____ Modest

_____ Slight

OBJECTIVE 5

Select from a list factors which affect quality grade. Write an "X" in the blank before each correct answer.

_____ 1. Smell

_____ 2. Wholesomeness

_____ 3. Ration

_____ 4. Carcass age

_____ 5. Gender

_____ 6. Color

_____ 7. Amount of fat

_____ 8. Amount of lean

OBJECTIVE 6

Select from a list factors which affect yield grade. Write an "X" in the blank before each correct answer.

_____ 1. Marbling

_____ 2. Amount of external fat

May be photocopied for student use.

____ 3. Carcass age

____ 4. Sex

____ 5. Area of the rib eye muscle

____ 6. Carcass weight

____ 7. Amount of internal or kidney, heart, and pelvic fat

OBJECTIVE 7

Match pork carcass yields to their correct grades. Write the correct letters in the blanks.

____ 1. U.S. No. 1

____ 2. U.S. No 2

____ 3. U.S. No. 3

____ 4. U.S. No. 4

a. 54.4% to 57.3.

b. 40.4% to 46.8%

c. 60.4% and over

d. 81.3% to 87.9%

e. Less than 54.4%

f. 57.4% to 60.3%

OBJECTIVE 8

Select from a list true statements concerning how a pork carcass is measured for length and backfat thickness. Write an "X" in the blank before each correct answer.

____ 1. Length is measured in inches from the forward edge of the aitch bone to the forward edge of the first rib near the cervical vertebrae.

____ 2. Carcass length ranges 24 to 36 inches on a 200-240 lb hog.

____ 3. Backfat thickness is measured at the first rib over the backbone in inches.

____ 4. If there is great variation in fat thickness along the carcass, adjustments should be made to compensate.

____ 5. All measurements are rounded to the nearest .1 of an inch and the skin is added into the measurement.

____ 6. If the carcass has been skinned, .1 of an inch is added to the backfat thickness.

May be photocopied for student use.

OBJECTIVE 9 **Match classes of lamb carcasses to their correct definitions.** Write the correct letters in the blanks.

____ 1. Carcass has round, narrow ribs which are red and porous, easily broken break joints, and lean which is fine textured and bright.

____ 2. Carcass has slightly wide and flat ribs, with either break or spool joints, and slightly coarser textured lean.

____ 3. Carcass has wide, flat ribs which are flinty and white, spool joints, and coarse textured lean.

a. Lamb
b. Ewe lamb
c. Mutton
d. Young mutton utility lamb
e. Yearling mutton

OBJECTIVE 10 **Match definitions of poultry classes to their correct class.** Write the correct letters in the blanks.

____ 1. A surgically castrated male chicken

____ 2. Mature male chicken with coarse skin, tough and darkened meat, and a hard breastbone tip

____ 3. A five to six week old immature chicken weighing less than two pounds which is of Cornish breeding

____ 4. Young, immature pigeon

____ 5. A young chicken (usually less than 13 weeks old and of either sex) that is tender-meated, with soft, pliable, smooth textured skin, and flexible cartilage in the breastbone

a. Tender hen
b. Cock or rooster
c. Fryer roaster
d. Hen, fowl, or baking or stewing chicken
e. Broiler turkey
f. Capon
g. Fryer turkey
h. Rock Cornish game hen
i. Squab
j. Broiler or fryer

May be photocopied for student use.

_____ 6. Mature female chicken with less tender meat than a roasting chicken and a non-flexible breastbone

_____ 7. A young turkey (usually under 16 weeks of age) that is tender-meated, with soft, pliable skin, and flexible breastbone cartilage

OBJECTIVE 11 **List factors which affect the quality grading of poultry.** Write six factors in the spaces below.

____

____

____

____

____

____

NOTE: Objectives 12-16 are evaluated on job sheets/assignment sheets in this unit. If you have not completed these components, see your instructor.

May be photocopied for student use.

WRITTEN TEST ANSWERS

QUALITY AND YIELD GRADING MEAT AND POULTRY PRODUCTS

VI

OBJECTIVE 1

Part	Part II
1. g	1. g
2. m	2. b
3. c	3. l
4. j	4. a
5. a	5. j
6. l	6. k
7. e	7. e
8. b	8. h
9. k	

OBJECTIVE 2

1. 1916
2. Fees collected from the meat packers
3. Harmless, indelible ink stamps
4. Changes in consumer preference and industry technology

OBJECTIVE 3 3, 5, 6, 9, 11, 14, 16, 18, 19

OBJECTIVE 4 4, 9, 8, 3, 6, 2, 1, 5, 7

OBJECTIVE 5 2, 4, 5, 6, 7

OBJECTIVE 6 2, 5, 6, 7

OBJECTIVE 7

1. c
2. f
3. a
4. e

OBJECTIVE 8 1, 4, 5, 6

OBJECTIVE 9

1. a
2. e
3. c

OBJECTIVE 10

1. f
2. b
3. h
4. i
5. j
6. d
7. g

OBJECTIVE 11 Answer should include six of the following:

- Conformation
- Fleshing
- Fat covering
- Defeathering
- Exposed flesh
- Disjointed or broken bones
- Discolorations of the skin and flesh
- Freezing defects

OBJECTIVE SHEET

FABRICATING CARCASSES AND BOX MEAT

VII

INTRODUCTION

There are many different ways to cut up or "fabricate" a carcass. Methods vary due to differences in consumer preference, carcass strengths, and other circumstances that determine the most profitable way of merchandising a particular carcass. Success comes only by recognizing all the market variations in an area and fabricating carcasses in a way that fulfills market need.

UNIT OBJECTIVE

After completing this unit, the student will be able to break beef, lamb, and pork carcasses into wholesale and retail cuts and identify various wholesale and retail cuts by their names according to the Uniform Retail Meat Identity Standards. Skills associated with fabricating carcasses will also be learned. The student will demonstrate these competencies by completing the assignment sheets, job sheets, and a written test with a minimum of 85 percent accuracy.

SPECIFIC OBJECTIVES

After completing this unit, the student will be able to:

1. Match terms associated with fabricating carcasses to their correct definitions.
2. Select from a list the information ICMISC recommends to be included on a meat label.
3. Label primal cuts of a carcass.
4. Select from a list true statements about boxed meat.
5. Choose the word or phrase to complete statements about fat trimming methods.
6. Choose the word or phrase to complete statements about portion control.
7. Select from a list factors considered in developing meat specifications.
8. Select from a list properties of quality packaging materials.
9. Match meat packaging materials with their descriptions.
10. State the recommended percentage of fat and lean for ground meat.

11. Choose the word or phrase to complete statements about the different ways to tenderize meat.

12. Label retail cuts of beef. (Assignment Sheet 1)

13. Label retail cuts of pork. (Assignment Sheet 2)

14. Label retail cuts of lamb. (Assignment Sheet 3)

15. Label variety cuts of meat. (Assignment Sheet 4)

16. Break beef into wholesale cuts. (Job Sheet 1)

17. Fabricate retail cuts of beef. (Job Sheet 2)

18. Break pork into wholesale cuts. (Job Sheet 3)

19. Fabricate retail cuts of pork. (Job Sheet 4)

20. Break lamb into wholesale cuts. (Job Sheet 5)

21. Fabricate retail cuts of lamb. (Job Sheet 6)

22. Scrape meat cuts. (Job Sheet 7)

23. Tenderize meat. (Job Sheet 8)

SUGGESTED ACTIVITIES

FABRICATING CARCASSES AND BOX MEAT VII

PREPARATION

- Obtain materials to supplement unit.

  NOTE: See Suggested Resources.

- Review instructional outline for this unit. Modify time frames to suit class needs and plan activities for each class period.
- Study the specific objectives to determine those you will cover in your presentation. Decide which objectives should be taught to which students.
- Determine scope and sequence of objectives that you add. Design and develop support materials, including evaluation techniques, for additional objectives.
- Determine how you will schedule time for students to demonstrate competence in the required procedures.
- Make arrangements for guest speakers. Supply speakers with specific objectives and other appropriate sections of the unit.
- Ensure that carcasses will be available for the job sheets.
- Collect skeletons from dead animals.
- Prepare classroom.
  - Put up posters, charts, and other items relating to fabricating carcasses and box meat.
  - Have articles, brochures, and other literature on meat fabrication available for students.

DELIVERY

Objectives 1 and 2

- Have speaker discuss the aspects of various fabrication methods.
- Take a field trip to local supermarkets to see if information recommended by the Uniform Retail Meat Identity Standards is included in meat label information.

Objective 3

- Use wall charts on wholesale cuts available from the National Live Stock Meat Board.
- Use prepared animal skeletons to instruct students regarding the bones in wholesale cuts.

Objectives 4 through 9

- Collect articles from meat industry publications on topics relevant to the objectives. Students can read articles for extra credit and giving reports.
- Collect samples of various packaging materials to show the students.
- Visit a meat processing plant which uses a hot trim method.

Objective 10

- Grind samples containing various percentages of fat and have the students cook them to demonstrate the cooking characteristics of various blends.
- Have a supermarket butcher talk to the students about the percentages of fat and the grades of lean that go into the types of ground beef.

Objective 11

- Discuss ways to tenderize meat.

APPLICATION

Objectives 12 through 15

- Use meat slides and flash cards of cuts, available from the National Live Stock Meat Board.
- Use the video tapes *Meat Cuts ID* and *Fabricating Beef, Pork, and Lamb* from Creative Educational Video on identification of meat cuts.
- Write the names of beef cuts on 3 X 5 cards and use with flash cards to make a "match game."
- Visit a local supermarket to identify retail cuts.
- Fabricate carcasses and test students on identification.

- Use Assignment Sheets 1-4 to provide students with the opportunity to develop skills in identifying retail and variety cuts of meat.

Objective 16 through 24

- Use Job Sheets 1 through 6 to provide students with the opportunity to develop skills in fabrication.
- Take a field trip to a meat processing plant to allow students to see commercial fabrication.
- Demonstrate the difference between a correctly scraped cut and an unscraped cut.
- Allow the students to taste meat and bone dust to demonstrate the desirability of its removal.
- Use Job Sheet 7 to give students the opportunity to develop skills in scraping meat.
- Use Job Sheet 8 to give students the opportunity to develop skills in operating meat tenderizing equipment.

EVALUATION

Practical Test

- Explain to students that they will be asked to demonstrate actions listed on the job sheets to complete the practical test.
- Describe the rating scale used on the practical test.
- Give practical test.
- Reteach and retest as necessary.

Written Test

- Explain to students that they will asked on the written test to demonstrate actions listed in the specific objectives.
- Give written test.

  NOTE: The written test may be given in sections if desired.
- Reteach and retest if necessary.
- Complete appropriate section of competency profiles.

- Review individual and group performance in order to evaluate teaching methods. Adjust scope, sequence, or instructional approaches for additional lessons as required.

SUGGESTED RESOURCES

Electronic Media

- *Beef Forequarter Fabrication*, VHS, 25 minutes, Creative Educational Video, Inc., DEPT, P. O. Box 65265, 5147-A 69th Street, Lubbock, TX 79464-5265 or call (800) 922-9965.
- *Beef Hindquarter Fabrication*, VHS, 21 minutes, Creative Educational Video, Inc., DEPT, P. O. Box 65265, 5147-A 69th Street, Lubbock, TX 79464-5265 or call (800) 922-9965.
- *Beef Retail Cuts Identification*, VHS, 45 minutes, Hobar Publications, 1234 Tiller Lane, St. Paul, MN 55112, (612) 633-3170.
- *Lamb Carcass Fabrication*, VHS, 24 minutes, Creative Educational Video, Inc., DEPT, P. O. Box 65265, 5147-A 69th Street, Lubbock, TX 79464-5265 or call (800) 922-9965.
- *Lamb Retail Cuts Identification*, VHS, 40 minutes, Hobar Publications, 1234 Tiller Lane, St. Paul, MN 55112, (612) 633-3170.
- *Meat Identification Slides*, 136 slides with script, National Live Stock and Meat Board, 444 North Michigan Ave., Chicago, IL 60611. To place order by phone: Outside of Illinois call 1-800-368-3138, in Illinois call (313) 670-9440 or (312) 670-9441 weekdays between the hours of 8:15 and 4:30 Central Standard Time.
- *Pork Carcass Fabrication*, VHS, 25 minutes, Creative Educational Video, Inc., DEPT, P. O. Box 65265, 5147-A 69th Street, Lubbock, TX 79464-5265 or call (800) 922-9965.
- *Pork Retail Cuts Identification*, VHS, 40 minutes, Hobar Publications, 1234 Tiller Lane, St. Paul, MN 55112, (612) 633-3170.

UNIT REFERENCES

- *Uniform Retail Meat Identity Standards*, National Live Stock and Meat Board, Chicago, Illinois.

- Romans, John R., Jones, Costello, Carlson, and Ziegler, *The Meat We Eat*, The Interstate Publishers and Printers, Danville, Illinois, 1985.

- *Meat Processing Plant Employee*, Vocational Instructional Services, Texas A & M, College Station, Texas.

- *The Meat Board Guide to Identifying Meat Cuts*, the National Live Stock and Meat Board, Chicago, Illinois.

- *Lessons on Meat*, available from the National Live Stock and Meat Board, Chicago, Illinois.

INFORMATION SHEET

FABRICATING CARCASSES AND BOX MEAT *VII*

OBJECTIVE 1

Match terms associated with fabricating carcasses to their correct definitions.

- **Boner** — Processor that bones out the complete carcass of older and low quality animals to be ground, processed, or canned
- **Chop** — Small, thin, tender cut that can be separated by a cleaver
- **Corned beef** — Cured and smoked beef
- **Deckle** — Layer of muscle and fat on the top surface of a brisket
- **Fabrication** — The process of cutting primal subdivisions into retail cuts
- **Fell** — Thin membrane separating the pelt from the subcutaneous fat of a lamb
- **Hanging tender** — Industry term for the diaphragm muscle
- **HRI** — Hotel, restaurant, and institution trade; group of meat retailers that require a narrow range of specifications as to grade, weight, size, and uniformity
- **IMPS** — Institutional Meat Purchase Specifications; general specifications for meat fabricated for institutional use
- **Longissimus dorsi** — Muscle system of the back which supports the animal; makes up the rib eye
- **Popliteal lymph node** — Lymph node in the leg which contains bacteria
- **Primal** — Wholesale cut or major subdivisions of a carcass
- **Purveyor** — Meat middleman that buys whole carcasses or primal cuts and then resells them to consumers or retail outlets with or without further processing
- **Quarter** — Half of a side of beef fabricated by splitting the half between the 12th and 13th ribs

- **Retail cut** — Subdivisions of primal cuts which are sold to the consumer in a ready-to-cook or ready-to-eat form

- **Roast** — A less tender cut of meat two inches or more in thickness; best cooked with moist heat

- **Sirloin tip** — That part of the muscle in a beef round anterior to the thigh bone

- **Steak** — Usually a more tender cut of one inch or less thickness; acceptable for broiling or braising

- **Subprimal** — Process of subdividing primal cuts into different parts which have differences in value and composition

OBJECTIVE 2

Select from a list the information ICMISC recommends to be included on a meat label.

All over the country, there are great variations in the way that carcasses are cut into primal and retail cuts. Also, there are a variety of names that retailers apply to the various cuts of meat. To clear some of the confusion, a committee of meat packers, processors and retailers was organized. The are known as the Industrial Cooperative Meat Identification Standards Committee (ICMISC), and they have produced a guide naming meat products and giving explicit directions about what constitutes a particular cut. This guide is called the *Uniform Retail Meat Identity Standards* and is published by the National Live Stock and Meat Board. This guide includes 314 descriptions of retail cuts in the United States and recommends that the following information be included on the label:

- **Species** — The first label item is the kind of meat, pork, beef, lamb, etc.

- **Primal Cut** — The wholesale cut that the cut comes from.

- **Retail Cut** — The (ICMISC) retail cut name.

- **Percentage of Lean** — Ground beef labels should contain the minimum percentage of lean meat the retailer guarantees.

If the retailer wants to, a non-uniform name can be added after this information such as "ground chuck," "fajitas" or "Filet Mignon." Cooking directions can also be added.

This labeling method is voluntary nationally, however, some states have made this method mandatory. If all retailers used this method, most of the confusion consumers have when buying meat would be prevented.

OBJECTIVE 3 **Label primal cuts of a carcass.**

The reason that carcasses are divided into different parts is to make portions that can be handled easily by one person.

The meat industry has always broken carcasses into primal or wholesale cuts according to the:

- relative value of the retail cuts
- tenderness of the meat contained in the cut

Other cuts are made to separate:

- lean areas from fat ones
- thick muscled areas from thin muscled ones

The less tender back legs are separated from the tender back portion, the thin muscled flank is cut from the thick shoulder, and the thick, leaner shoulder is cut from the fat brisket.

By dividing the carcass into different types, retailers and processors can purchase exactly what they need to meet their demand; a bacon company can buy sides to smoke or a retailer in an up-scale urban area can buy sirloins for steaks.

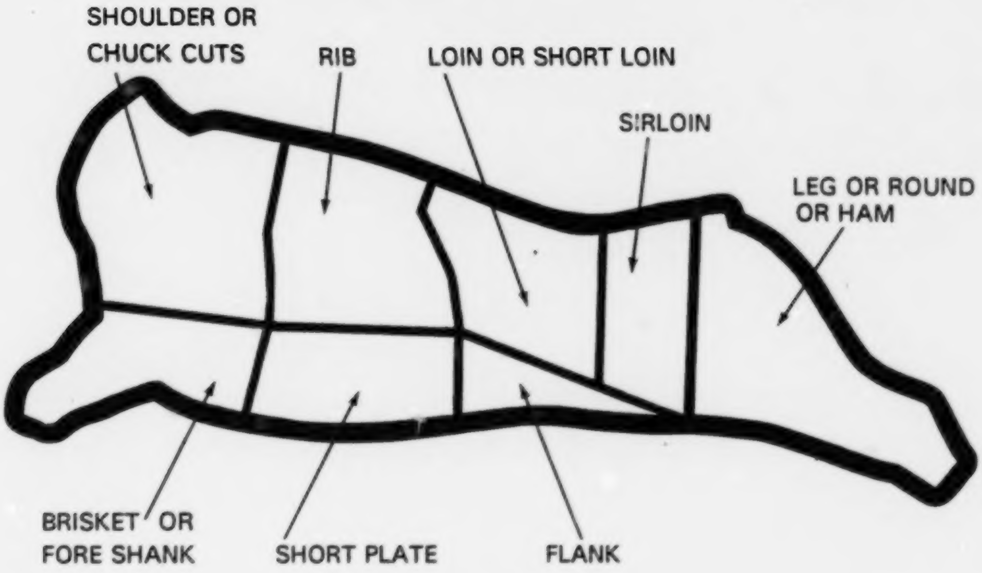
There is much more uniformity in the processing of pork carcasses as compared to beef. Almost all pork carcasses are processed before leaving the plant. Also, about two-thirds of all pork is processed or smoked.

Because of the size of the pork carcass (an average 160-170 lbs., compared to a 600 lbs. beef carcass) and the uniformity in methods of fabrication, pork carcasses have fewer wholesale and retail cuts. The wholesale clear plate and fat back are composed completely of fat and are rendered into lard.

Most packers do not split lamb carcasses because of their small size (usually about 50 lbs.). Also, industrially processed lambs are not ribbed. They are shipped whole because ribbed carcasses dehydrate and shrink.

Since lamb carcasses are not split, they are usually halved into a hindsaddle and foresaddle during fabrication. This split is easily accomplished by inserting a knife between the 12th and 13th rib and splitting both sides, then sawing the backbone. Carcasses are divided into only wholesale cuts.

Although some variations exist in the exact locations of primal cut lines, beef, lamb, and pork carcasses are generally broken in the manner illustrated below.



OBJECTIVE 4 **Select from a list true statements about boxed meat.**

Historically meat packers slaughtered animals and sold whole carcasses hanging on the rail. Wholesalers might break some carcasses into primal parts for quick resale, but most carcasses went directly to the retailer in carcass form. This caused real problems with inventory due to varying demand for particular parts of the carcass. By the mid-70's most packers had changed to a system of breaking carcasses into primal and subprimal cuts, wrapping them in protective packaging, and shipping them boxed. The term boxed beef comes from this system.

By breaking carcasses at the plant and packaging them in shrink wrap film:

- Shelf life and freshness are greatly improved.
- Inventory controls for retailers, wholesalers, and packers have been streamlined.
- Quality control and uniformity are assured.

OBJECTIVE 5

Choose the word or phrase to complete statements about fat trimming methods.

Consumers in today's market show a marked aversion to fat on meat cuts. To satisfy this demand for lean meat, packers and retailers are trimming meat cuts much closer today than previously. Most retail cuts today are sold with a ¼ inch or less of fat trim. Many high volume HRI chains require cuts with even less fat than ¼ inch. A few packers have been experimenting with trimming fat from the carcass immediately after slaughter. Because of the lack of firmness in the fat and meat of a hot carcass, trimming is very difficult using a knife and normal trimming procedures. A U-shaped blade is used to scrape fat off the carcass. Even this method is fairly difficult to master. In normal fat trimming methods, a sharp knife, a respectable knowledge of the musculature of the animal, and a sense of "feel" are required to do a good job of trimming fat.

OBJECTIVE 6

Choose the word or phrase to complete statements about portion control.

Consumer buying patterns have changed dramatically in the past twenty years. Smaller families, faster life-styles, health consciousness, and working women have all contributed to changes in the meat industry. All of these factors have prompted changes in the way meat is retailed. Much less fat, smaller portions, packaging for quick cooking, and more complete boning are all responses to consumer demands.

The explosion of the fast food industry and the HRI trade have added new markets for meat. Both of these areas are very competitive. Their buyers have exact requirements for composition, portion size, weight, shape, and preparation convenience. This demand for an exact product, made from animals which vary tremendously in characteristics, has started a completely new sub-industry to meet the demand.

OBJECTIVE 7

Select from a list factors considered in developing meat specifications.

Meat varies in quality and value. For example, a round from a high quality animal is worth much more than a round from a low quality animal. Because of this variation in quality and value, the meat industry has developed specifications to denote variations in quality, quantity, and type. Even the way a cut is processed affects the value... Is the cut trimmed to less than ¼ of an inch? or have high quality and expensive packaging been used to protect freshness and increase shelf life? A thorough set of specifications will define product quality and will be valuable to the buyer.

Some of the areas which specifications should address are:

- **Cut** — Typical cut specifications should follow ICMISC recommendations and include species, primal, and retail cut, if needed.
- **Portion Control** — Should set requirements for size in the cut.
- **Grade** — Should follow USDA quality grade.
- **Age** — Should generally cover the period that the product has been in the cooler since slaughter.
- **Pack** — Pack is important, particularly if the product is to be held frozen for an extended period of time. Packaging specifications are not as significant if the product will be used immediately.
- **Shrink** — Shrink is the loss of weight since packaging due to dehydration in the freezer. Usually shrink specifications are given as a range of percentage weight loss.
- **Yield** — Yield specifications are a minimum acceptable percentage yield of product when the primal is fabricated. An acceptable yield percentage will vary due to which primals and species are being fabricated.
- **Trim** — Trim specifications should include specific requirements concerning the amount of fat and bone left on a cut. Detailed trim specifications reduce the chance of misunderstanding trim requirements.

OBJECTIVE 8 **Select from a list properties of quality packaging materials.**

Packaging materials used in the meat industry serve varied purposes. The ideal packaging material must keep meat in a proper state of freshness until it reaches the consumer, fit the requirements of the packager, and still be affordable. *The Meat We Eat* lists eleven properties of quality packaging materials. These materials:

- Have low moisture-vapor transmission
- Have differing oxygen permeability depending on the use
- Have good tensile strength and are puncture resistant
- Are pliable
- Will maintain pliability and strength in sub-zero temperatures

- Are non-toxic
- Are odorless
- Provide for ease of marking for identification
- Have good stripping qualities (will peel from meat when frozen)
- Are grease-proof and stain-proof
- Provide good sealing properties

Romans, Jones, Costello, Carlson, and Ziegler, *The Meat We Eat*, The Interstate Publishers and Printers, Inc., 1985. Used by Permission.

OBJECTIVE 9 **Match meat packaging materials to their description.**

Finding a material that is excellent in all these areas is impossible. Some materials are much more suitable than others. Materials that are used as packaging materials for meat are divided into six general groups:

Kraft paper

This wood pulp based paper is probably the wrapping material most used by local meat processors for freezing meat. These papers come in many forms that give protection against oil, grease, chemicals, vapors, and oxygen transmission. Some types of vegetable parchments are resistant to oxygen, carbon dioxide, and nitrogen. Others have very good anti-sticking properties which make them useful as dividers for frozen meat.

Cellophane

Cellophane was once used extensively for retail packaging but is not as prominent since the development of polyvinyl chloride film. When cellophane is dry it has a low oxygen transmission rate, however when it comes in contact with a cut meat surface, the water in the meat causes a significant increase in oxygen transmission. This helps keep meat in retail counters a bright red color through surface oxygenation of the meat. Cellophane is not a good freezing material because its high oxygen transmission properties will shorten the shelf life of the product. Consequently, meat bought to freeze should be rewrapped in an oxygen barrier material.

Aluminum foil

Home consumers are the primary users of aluminum foil for home freezing.

Some of the advantages of aluminum foil are: it is easy to work with, readily available, and can be used in the cooking process. Some of its disadvantages are: it is easily torn, it is very prone to puncture, and it can't be used in microwave ovens.

Laminated foils

Laminated foils are used extensively for heat-sterilized meat products such as beef sticks, jerky, etc. They are highly resistant to punctures making them an ideal economic means of offering sterilized shelf label products.

Films

Copolymer films are films having multiple layers of different polymers that meet specific needs of different meat products. Particular films are very abrasion resistant, provide an excellent oxygen barrier, and can be heat-shrunk to form a tight seal to protect the meat (vacuum packaging). Copolymers are the predominant packaging material in the meat industry.

Dermatex

Dermatex is a food-grade product in which processed meat products such as sausages are dipped. This forms a casing which is edible. Dermatex is made from distilled animal fats. The most predominant use for this material is in sausages such as summer sausage, liver sausage, bologna, etc.

OBJECTIVE 10 **State the recommended percentage of fat and lean for ground meat.**

Meat cuts which are not very tender or in small amounts can be more suitably utilized by grinding to break up the meat fibers. Low quality animals, either because of age or breeding, that are not suitable for other purposes, can be ground and mixed with the fat trim from other animals to produce an acceptable meat product. Today, the largest portion of beef consumed by the American public is in the form of ground meat. The USDA has strict guidelines about what can go into ground meat. For example, products labeled "ground beef" cannot contain more than 30 percent fat. Water, coloring agents, binders or extenders cannot be added. If the name is qualified by the name of a particular cut such as "ground beef round" the product must consist entirely of meat from that particular cut, although fat may be added not to exceed 30 percent. If extenders are used they must be named in the label.

High quality ground beef should have visible fat ranging from 15 to 30 percent. Very lean ground meat is relatively tough, flavorless, and dry. If grinding is done by hand using various cuts with varying amounts of fat, then only by experience and trial and error can the correct mix be determined.

OBJECTIVE 11 **Select from a list the different ways to tenderize meat.**

Meat from certain parts of the carcass contains a relatively higher percentage of connective tissue or contains muscle systems that have been exercised frequently causing toughness. Three ways to improve meat tenderness are by:

- mechanically breaking down muscle fibers and connective tissue
- electrical stimulation at slaughter
- chemical means.

Mechanical tenderization is done by machine or by hand to shorten or break up connective tissues and tough muscle fibers. Cubing is the process of passing meat through a machine that contains rollers from which many tiny knives project. As the meat passes through, the knives partially cut the tissues and reknits them together. Small pieces of meat passed through a cuber can be formed into a portion of a desired size. A tenderizer is a machine similar to a cuber except that it uses needles instead of knives and there is less breakdown.

Tenderization can also be accomplished on some cuts by hand scoring, which is the cutting of small shallow cuts across the muscle fiber, frequently in a diamond pattern. This process increases tenderness by shortening muscle fiber. Flank steak is typically scored. Pounding with a mallet, a cleaver, or with a special waffle-patterned tool breaks down tough muscle fibers.

Electrical stimulation is rapidly gaining acceptance in the meat industry as an acceptable way to improve tenderness and flavor. Immediately after slaughter an electrical current is passed through the muscles of the carcass for a short period of time. This causes the carcass to undergo a rapid series of muscle contractions and relaxations. Normal chemical and physical events that occur in muscle after death, associated with rigor mortis, are rapidly accelerated. Acid levels are decreased, thus improving lean color and marbling definition. Tenderness is markedly improved and the incident of heat ring is dramatically reduced.

Research indicates that electrically stimulated carcasses will have a five percent increase in the number that will grade "choice." A 33 percent increase in meat tenderness has been found in electrically stimulated beef and lower increases have been noted in pork and lamb. Other advantages for packers include a faster and more complete blood loss at slaughter and a faster chilling time. The carcasses are reported to be somewhat easier to skin which improves killing times.

The chemical methods of tenderization includes the use of enzymes and aging. In a packing plant, enzymes derived from certain tropical plants are used on the meat to degrade the muscle fibers and connective tissue to improve tenderness. The three most popular enzymes are papain, bromelin, and ficin which are derived from the papaya, pineapple, and fig respectively. Of the three, papain is the most commonly used enzyme. Bromelin attacks connective tissue but does little to meat fibers. Ficin breaks down connective tissue and also breaks down proteins in muscle fibers. If meat is over tenderized the texture resembles mush. Most commercial tenderizers used in restaurants are a blend of all three enzymes.

Beef is aged much more frequently than pork or lamb. In aging, carcasses are hung in a moderately cool environment for several days, thus reducing the acid levels in the meat so naturally occurring enzymes can break down meat fibers and connective tissue. The carcass can also be treated with a solution containing fungi or bacteria. This process improves not only the tenderness, but also improves the flavor. Some research indicates that aged meat has a higher oxygenation rate when frozen than fresh beef. This indicates that aged beef has a shorter storage life when frozen than fresh beef.

SUPPLEMENT 1

FABRICATING CARCASSES AND BOX MEAT

VII

INTRODUCTION

Tables are available which estimate yield for a particular cut. Knowing the carcass weight an expected weight range for a particular cut is given. Exact estimates can be extrapolated from the table. For example, the table gives a weight range of 12-14 lbs. for a brisket from carcasses weighing 500-600 lbs. If a certain carcass weighs 550 lbs., then by extrapolation the predicted brisket weight should be 13 lbs.

INDEX OF PRODUCTS AND WEIGHT RANGE TABLE

Product	Range A	Range B	Range C	Range D
	Pounds	Pounds	Pounds	Pounds
Carcass	500-600	600-700	700-800	800-up
Carcass, Trimmed	475-575	575-675	675-775	775-up
Carcass, Streamlined	337-400	400-470	470-600	600-up
Side	250-300	300-350	350-400	400-up
Forequarter	131-157	157-183	183-210	210-up
Forequarter, Boneless	104-125	125-146	146-168	168-up
Forequarter, Streamlined	91-110	110-128	128-147	147-up
Rib, Primal	24-28	28-33	33-38	38-up
Rib, Oven-Prepared, Regular	19-22	22-26	26-30	30-up
Rib, Oven-Prepared	17-19	19-23	23-26	26-up
Rib, Oven-Prepared, Boneless & Tied	13-16	16-19	19-22	22-up
Rib, Roast-Ready	14-16	16-19	19-22	22-up
Rib, Roast-Ready, Special	14-16	16-19	19-22	22-up
Blade Meat	Over 3	—	—	—
Rib, Roast-Ready, Boneless & Tied	11-13	13-16	16-19	19-up
Spencer Roll	10-12	12-15	15-17	17-up
Ribeye Roll	5-6	6-8	8-10	10-up
Ribeye Roll, Lip-On	6-7	7-9	9-11	11-up
Square-Cut Chuck	66-79	79-93	93-106	106-up
Square-Cut Chuck, Divided	66-79	79-93	93-106	106-up
Shoulder Clod	13-15	15-18	18-21	21-up

Product	Range A	Range B	Range C	Range D
	Pounds	Pounds	Pounds	Pounds
Shoulder Clod Roast	Under 15	15-18	18-21	21-up
Square-Cut Chuck, Boneless	54-65	65-77	77-88	88-up
Square-Cut Chuck, Boneless, Clod Out	40-48	48-57	57-65	65-up
Chuck Roll	13-15	15-18	18-21	21-up
Chuck Tender	Under 1	1-3	3-up	----
Foreshank	7-8	8-10	10-12	12-up
Brisket	12-14	14-16	16-18	18-up
Brisket, Boneless, Deckle On	9-10	10-12	12-14	14-up
Brisket, Boneless, Deckle Off	6-8	8-10	10-12	12-up
Short Plate	20-27	27-31	31-35	35-up
Short Plate Boneless	12-14	14-16	16-18	18-up
Short Plate Boneless Special	8-12	12-14	14-16	16-up
Skirt Diaphragm	1-2	2-3	3-up	----
Skirt Transversus	1-3	3-4	4-up	----
Full Plate	28-37	37-44	44-51	51-up
Full Plate, Boneless	21-17	17-29	29-32	32-up
Short Ribs	2-3	3-4	4-5	5-up
Short Ribs, Short Plate	Amount as specified			
Short Ribs, Special	Amount as Specified			
Armbone Chuck	77-88	88-103	103-118	118-up
Armbone Chuck, Boneless	59-70	70-82	82-90	90-up
Armbone Chuck, Boneless, Clod Out	46-57	57-69	69-77	77-up
Cross-Cut Chuck	86-103	103-120	120-138	138-up
Cross-Cut Chuck, Boneless	68-81	81-95	95-109	109-up
Triangle	107-129	129-150	150-172	172-up
Triangle, Boneless	83-101	101-117	117-134	134-up
Beef Bones	Amount as specified			
Diced Beef	Amount as Specified			
Beef for Stewing	Amount as Specified			
Ground Beef, Regular	Amount as Specified			
Ground Beef, Regular, TVP Added	Amount as Specified			

Product	Range A	Range B	Range C	Range D
	Pounds	Pounds	Pounds	Pounds
Ground Beef, Special	Amount as Specified			
Ground Beef, Special, TVP Added	Amount as Specified			
Hindquarter	119-143	143-167	167-190	190-up
Hindquarter, Boneless	90-108	108-126	126-143	143-up
Hindquarter, Streamlined	96-115	115-134	134-152	152-up
Hindquarter, Trimmed	110-132	132-155	155-178	178-up
Round, Primal	59-71	71-83	83-95	95-up
Round, Boneless	44-53	53-62	62-71	71-up
Round, Shank Off, Partially Boneless	47-57	57-67	67-76	76-up
Round, Shank Off, Boneless	44-53	53-62	62-71	71-up
Round, Shank Off, 3-Way Boneless	41-50	50-58	58-66	66-up
Round, Rump, & Shank Off	40-48	48-56	56-64	64-up
Round, Rump, & Shank Off, Boneless	35-43	43-50	50-57	57-up
Round, Rump, & Shank Off, Boneless, Special	38-46	46-54	54-60	60-up
Round, Rump, & Shank Off, Boneless, Tied, Special	38-46	46-54	54-60	60-up
Round, Rump, & Shank Off Boneless, Tied	35-43	43-50	50-57	57-up
Round, Rump Partially Removed, Shank Off	44-52	52-61	61-70	70-up
Knuckle	8-9	9-11	11-13	13-up
Knuckle, Special	8-9	9-11	11-13	13-up
Top (Inside) Round	14-17	17-20	20-23	23-up
Bottom (Gooseneck) Round	18-21	21-25	25-29	29-up
Bottom (Gooseneck) Round Heel Out	17-20	20-24	24-28	28-up
Bottom (Gooseneck) Round Untrimmed	18-21	21-25	25-29	29-up
Bottom (Gooseneck) Round Untrimmed, Heel Out	17-20	20-24	24-28	28-up
Outside Round	8-10	10-13	13-16	16-up
Eye of Round	Under 3	3-5	5-up	—
Full Loin, Trimmed	35-42	42-50	50-57	57-up
Short Loin	17-21	21-25	25-28	28-up
Strip Loin, Short Cut	14-19	19-23	23-26	26-up
Strip Loin	11-13	13-16	16-19	19-up
Strip Loin, Boneless	8-10	10-12	12-14	14-up

Product	Range A	Range B	Range C	Range D
	Pounds	Pounds	Pounds	Pounds
Strip Loin, Intermediate	10-12	12-14	14-16	16-up
Strip Loin, Short Cut	8-10	10-12	12-14	14-up
Strip Loin, Short Cut, Boneless	7-8	8-10	10-12	12-up
Sirloin	16-19	19-24	24-28	28-up
Sirloin Butt, Boneless	11-14	14-16	16-19	19-up
Sirloin Butt, Trimmed	9-10	10-13	13-15	15-up
Top Sirloin Butt	6-7	7-9	9-11	11-up
Bottom Sirloin Butt	4-5	5-6	6-7	7-up
Bottom Sirloin, Flap	1-3	3-up	----	----
Bottom Sirloin, Ball Tip	1.5-3	3-up	----	----
Bottom Sirloin, Triangle	1.5-3	3-up	----	----
Bottom Sirloin, Triangle, Defatted	1.5-3	3-up	----	----
Bottom Sirloin Butt, Trimmed	2-3	3-4	4-5	5-up
Full Tenderloin	4-5	5-6	6-7	7-up
Full Tenderloin, Defatted	3-4	4-5	5-6	6-up
Full Tenderloin, Special	2-3	3-4	4-up	----
Full Tenderloin, Skinned	2-3	3-4	4-up	----
Butt Tenderloin	1-2	2-3	3-4	4-up
Short Tenderloin	2-3	3-4	4-up	----
Flank Steak	under 1	1-2	2-up	----

NOTE: The weight ranges or cuts as shown in these tables do not necessarily reflect any relation to the carcass weight ranges. Studies have shown that all carcasses within a given weight range will not produce cuts that are uniform in weight. Therefore, in ordering cuts, purchasing officials should specify the weight range(s) desired without regard to the carcass weights shown in the various ranges.

Courtesy of the Instructional Materials Service, Texas A & M University, College Station, Texas.

INDEX OF PORTION-CUT PRODUCTS AND WEIGHT RANGE TABLE

Product	Portion Size										
	3 oz.	4 oz.	6 oz.	8 oz.	10 oz.	12 oz.	14 oz.	16 oz.	18 oz.	20 oz.	24 oz.
Cubed Steaks	X	X	X	X							
Cubed Steaks, Special	X	X	X	X							
Braising Steaks, Swiss		X	X	X							
Rib Steaks				X	X	X	X	X	X		
Rib Steaks, Boneless		X	X	X	X	X					
Rib Eye Roll Steaks		X	X	X	X	X					
Rib Eye Roll, Lip-On, Steaks		X	X	X	X	X					
Ground Beef Patties, Regular		Size as Specified									
Ground Beef Patties, Regular, TVP Added		Size as Specified									
Ground Beef Patties, Special		Size as Specified									
Ground Beef Patties, Special TVP Added		Size as Specified									
Knuckle Steaks	X	X	X	X	X						
Top (Inside) Round Steaks	X	X	X	X	X	X					
Bottom (Gooseneck) Round Steaks	X	X	X	X	X	X	X	X	X	X	X
Porterhouse Steaks					X	X					
Porterhouse Steaks, Intermediate					X	X	X	X	X	X	X
Porterhouse Steaks, Short Cut					X	X	X	X	X	X	X
T-Bone Steaks				X	X	X	X	X	X	X	X
T-Bone Steaks, Intermediate				X	X	X	X	X	X	X	X
T-Bone Steaks, Short Cut				X	X	X	X	X	X	X	X
Strip Loin Steaks, Bone-In, Intermediate			X	X	X	X	X	X	X	X	
Strip Loin Steaks, Boneless, Intermediate				X	X	X	X	X	X	X	X
Strip Loin Steaks, Bone-In, Short Cut				X	X	X	X	X	X	X	X
Strip Loin Steaks, Bone-In, Extra Short Cut				X	X	X	X	X	X	X	X
Strip Loin Steaks, Bone-In, Special				X	X	X	X	X	X	X	X

Product	Portion Size										
	3 oz.	4 oz.	6 oz.	8 oz.	10 oz.	12 oz.	14 oz.	16 oz.	18 oz.	20 oz.	24 oz.
Strip Loin Steaks, Boneless, Short Cut			X	X	X	X	X	X	X	X	
Strip Loin Steaks, Boneless, Extra Short Cut		X	X	X	X	X	X	X	X		
Strip Loin Steaks, Boneless, Special			X	X	X	X	X	X	X	X	
Top Sirloin Butt Steaks		X	X	X	X	X	X	X	X	X	X
Top Sirloin Butt Steaks, Semi-Center Cut		X	X	X	X	X	X	X			
Top Sirloin Butt Steaks, Center Cut		X	X	X	X	X	X	X			
Tenderloin Steaks		X	X	X	X	X	X				
Tenderloin Steaks, Defatted	X	X	X	X	X	X	X				
Tenderloin Steaks, Special	X	X	X	X	X	X	X				
Tenderloin Steaks, Skinned	X	X	X	X	X	X	X				

Courtesy of the Instructional Materials Service, Texas A & M University, College Station, Texas.

FABRICATING CARCASSES

The methods used in fabricating carcasses are, to a great degree, determined by the type of operation that is doing the fabrication. The large multi-plant operations that specialize in carcasses of a certain grade and weight generally use only one method, box the wholesale cuts, and sell them in large volumes to large retail chains and wholesalers. A boner operation completely removes all bone and fat from mature animals and then mixes the meat with fat from young carcasses to make ground meat. Other large operations are called "kill and chill" plants and market only whole carcasses and slaughter by-products. Middle size plants might specialize in only outsized or poor graded carcasses and ship them whole to a wholesaler or a "breaker." Small locally owned operations, called locker plants, custom slaughter and process carcasses for local and private consumption. All of these operations vary in their methods of fabrication depending on venues of marketing they have available to them and the quality and type of animals they are processing.

For instance, one packer who is slaughtering high quality, high yielding cattle may be selling sirloins to a HRI purveyor that has very narrow requirements as to grade, portion control, and uniformity, but also pays a premium price. On the other hand, a packer who is slaughtering low quality holstein steers may be boning out the sirloin and mixing it with fat trim from other carcasses to make hamburger meat and selling this for much less than another packer gets for sirloin.

Another example would be two retail meat markets in different towns that both buy pork loins. Due to the demand for pork chops in one town, the loins would be cut into chops and in the other, roasts would be made in response to customer demands.

As you can see, fabrication methods vary greatly depending on carcass characteristics, the type of operation, and market variations. When these variables are gauged correctly, fabrication methods can be tailored to assure maximum profitability.

ASSIGNMENT SHEETS 1-4

Development of:
EMPLOYABILITY SKILLS

- Introduce the assignment to the student by discussing why employability skills are important.

- Discuss with them the following skills which are relevant to this task:

  EMPLOYABILITY SKILLS

  — Mastering specific job task/procedure

- If students have difficulty mastering a specific job task/procedure:

  — Emphasize the fact that practice makes a person proficient, and proficiency makes a person confident.

  — Suggest they develop their own method of categorizing cuts.

  — Have students review the photographs and slides to determine which types are causing difficulty.

  — Allow the student to observe as classmates perform the task.

ASSIGNMENT SHEET 1

FABRICATING CARCASSES AND BOX MEAT

VII

OBJECTIVE 12

Label retail cuts of beef.

INTRODUCTION

Job Acquisition/ Development Skills

- Master specific job task/procedure

To correctly identify any cut, regardless of species, an understanding of the skeletal structure and muscle systems of the animal must be mastered. Often the name of the cut is associated with the bones present. To visualize what the bones present in a cut will look like, visualize the cross-section of the bones present and that is what you will see on the face of the cut of meat. Knowing which muscles are present in different parts of the carcass helps you visualize what cuts should look like.

Because primals can be cut up in different ways, the same point on the carcass can be included in many different cuts, often with different names, depending on the method used to fabricate the wholesale cut. Retail cuts will be evaluated by the primal from which they are cut. Steaks can be cut from the same portion as a roast. The only difference in the two cuts is in the variation in thickness.

DIRECTIONS

Your instructor will show slides of different retail cuts of beef. Write the correct name in the spaces below.

1. ______________________________
2. ______________________________
3. ______________________________
4. ______________________________
5. ______________________________
6. ______________________________
7. ______________________________
8. ______________________________
9. ______________________________
10. ______________________________

11. ______________________________

12. ______________________________

13. ______________________________

14. ______________________________

15. ______________________________

16. ______________________________

17. ______________________________

18. ______________________________

19. ______________________________

20. ______________________________

21. ______________________________

22. ______________________________

23. ______________________________

24. ______________________________

25. ______________________________

26. ______________________________

27. ______________________________

28. ______________________________

29. ______________________________

30. ______________________________

31. ______________________________

32. ______________________________

33. ______________________________

34. ______________________________

35. ______________________________

36. ____________________

37. ____________________

38. ____________________

39. ____________________

40. ____________________

41. ____________________

42. ____________________

43. ____________________

ASSIGNMENT SHEET 2

FABRICATING CARCASSES AND BOX MEAT

VII

OBJECTIVE 13

Label retail cuts of pork.

INTRODUCTION

Pork retail cut identification is similar to beef identification; many of the cuts come from corresponding places on the respective carcasses. As in beef identification, knowledge of the skeletal structure helps in identifying retail cuts.

DIRECTIONS

Your instructor will show slides of different retail cuts of pork. Write the correct name in the space below.

Job Acquisition/ Development Skills
- Master specific job task/procedure

1. ______________________________
2. ______________________________
3. ______________________________
4. ______________________________
5. ______________________________
6. ______________________________
7. ______________________________
8. ______________________________
9. ______________________________
10. ______________________________
11. ______________________________
12. ______________________________
13. ______________________________
14. ______________________________
15. ______________________________
16. ______________________________

17. ______________________________

18. ______________________________

19. ______________________________

20. ______________________________

21. ______________________________

22. ______________________________

23. ______________________________

24. ______________________________

25. ______________________________

26. ______________________________

27. ______________________________

OBJECTIVE 14

Label retail cuts of lamb.

INTRODUCTION

When visualizing retail cuts of lamb, remember a lamb carcass is not split like a pork or beef carcass, so primal cuts of lamb contain both sides of the carcass.

DIRECTIONS

Your instructor will show slides of different retail cuts of lamb. Write the correct name in the spaces below.

Job Acquisition/ Development Skills
- Master specific job task/procedure

1. ______________________________
2. ______________________________
3. ______________________________
4. ______________________________
5. ______________________________
6. ______________________________
7. ______________________________
8. ______________________________
9. ______________________________
10. ______________________________
11. ______________________________
12. ______________________________
13. ______________________________
14. ______________________________
15. ______________________________
16. ______________________________
17. ______________________________

ASSIGNMENT SHEET 4 — FABRICATING CARCASSES AND BOX MEAT — VII

OBJECTIVE 15 **Label variety cuts of meat.**

INTRODUCTION Variety cuts of meat include the livers, kidneys, hearts, tongues, brains, and other internal organs which are edible.

DIRECTIONS Your instructor will show slides of different variety cuts of meat. Write the correct name in the spaces provided.

Job Acquisition/ Development Skills
- Master specific job task/procedure

1. ______________________________
2. ______________________________
3. ______________________________
4. ______________________________
5. ______________________________

ASSIGNMENT SHEETS 1-4

Ensure that students have filled in the answers according to the order in which the slides were shown.

JOB SHEETS 1-6

Development of:
READING SKILLS
CREATIVE THINKING AND PROBLEM SOLVING SKILLS
EMPLOYABILITY SKILLS

- Introduce the assignment to the students by discussing why reading, creative thinking and problem solving, and employability skills are important.

- Discuss with them the following skills which are relevant to this task.

  READING SKILLS

  - Gaining factual information
  - Following written instructions

  CREATIVE THINKING AND PROBLEM SOLVING SKILLS

  - Transferring knowledge or training to new situations

  EMPLOYABILITY SKILLS

  - Mastering specific job task/procedure
  - Applying safety practices/procedures
  - Developing good work habits/attitudes

- If students have difficulty gaining factual information, remind them to read carefully, noting key words and ideas.

- If students have difficulty following written instructions:

  - Discuss the possible consequences of not following instructions precisely.
  - Have them read the instructions several times, noting the key words and ideas.

- If students have difficulty transferring knowledge or training to new situations:
  - Review the pertinent training.
  - Compare the new situation to the training situation.
  - Examine ways in which training can be used in the new situation.
- If students have difficulty mastering a specific job task/procedure:
  - Review the entire procedure.
- If students have difficulty applying safety practices/procedures:
  - Discuss the reasons for and the importance of each safety practice.
  - Instruct them in the use of various techniques to help them remember safety practices.

    Visualization — make a mental picture

    EXAMPLE: Visualize how a person looks using a sharp boning knife, pointing the knife away from the body, with hands placed safely before making cuts.

    Association — connecting new term with something you already know

    EXAMPLE: Connect the bone shears to the garden shears used in trimming limbs and use the same caution in cutting with them.
- If students have difficulty practicing good work habits/attitudes:
  - Encourage them to become familiar with the entire procedure before they begin the work.
  - Discuss the role that good work habits/attitudes have in obtaining and retaining employment.
  - Discuss what behaviors and attitudes constitute good work habits.
  - Make sure the student knows what is expected of him or her.
- For additional suggestions on teaching basic skills, refer to Instructional Supplement 1.

JOB SHEET 1 — FABRICATING CARCASSES AND BOX MEAT — VII

OBJECTIVE 16

Break beef into wholesale cuts.

INTRODUCTION

The first step in fabricating a beef carcass is to divide the carcass into primal cuts. Because the slaughter process divides beef carcasses into two halves by sawing down the backbone, one starts with a half carcass in fabricating the wholesale cuts.

EQUIPMENT AND SUPPLIES

- Beef carcass half
- Hand meat saw
- Butcher knife
- Cutting table
- Band saw
- Scraper

SAFETY

Before you can do this procedure, your instructor must have approved your use of knives and saws. Be sure to follow all safety rules when using this equipment.

PROCEDURE

1. Break the half carcass into two quarters.

   The first step is to break the half carcass into two "quarters" by breaking between the 12th and 13th ribs. Since counting ribs can sometimes be difficult in practice, the exposed cut faces of the vertebrae are counted instead. Starting at the pelvis, count forward the six lumbar vertebrae and then one and a half thoracic vertebrae. Here is where the backbone is to be severed using a saw. When the backbone has been completely separated with the saw, a knife is used to finish the cut between the ribs. Usually in a packing plant, the cut isn't made completely through, which leaves a section of the flank attached to the plate, allowing the front quarter to be supported on the rail.

Reading Comprehension Skills
- Gain factual information

Functional Reading Skills
- Follow written instructions

Cognitive Activities Skills

- Transfer knowledge/ training to new situations

Job Acquisition/ Development Skills

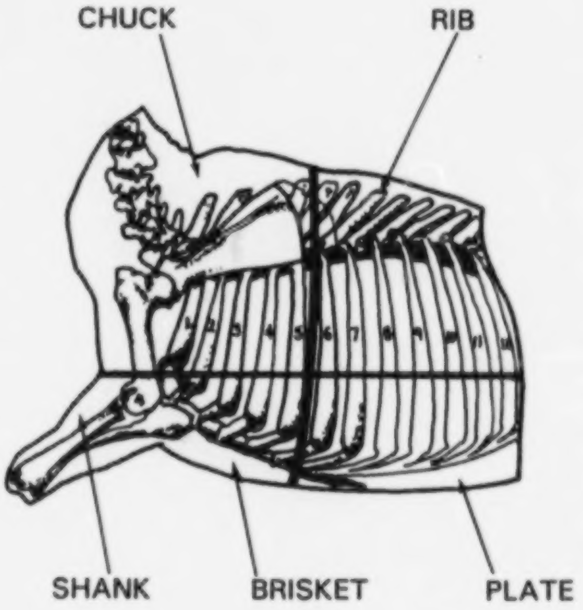
- Master specific job task/procedure
- Apply safety practices/ procedures
- Develop good work habits/ attitudes

2. Break the front quarter.

   When the front quarter is severed completely from the hindquarter, place the front quarter on the cutting table inside up. The front quarter is first divided into two parts, the rib and plate and the chuck, shank, and brisket. To accomplished this, count the ribs backward on the inside, from the 12th to the 5th rib. A butcher knife can be stuck between the 5th and 6th ribs, directly below the loin, to mark the spot where the rib and chuck are to be separated. Turn the quarters over and use a hand saw to divide the backbone directly over the point stuck between the 5th and 6th rib. Complete the cut by cutting with a knife between the 5th and 6th ribs closely following the 5th rib.

3. Divide the wholesale plate from the rib.

   The wholesale plate is divided from the rib by cutting perpendicular to the backbone about 10 inches from the chine on the large end of the rib. This cut should be made with a saw and should end about 8 inches from the chine on the small end.



BEEF FOREQUARTER

All of the drawings of fabricated meat cuts in this unit are courtesy of the Instructional Materials Service, Texas A & M University, College Station, Texas.

4. Fabricate a wholesale rib.

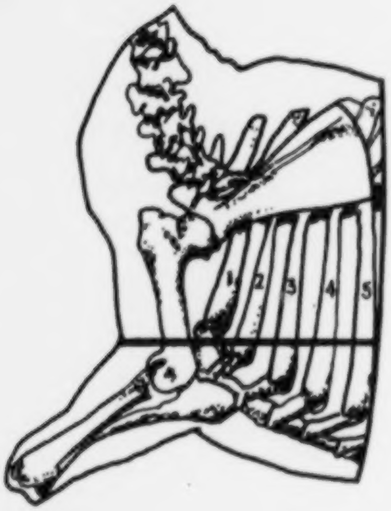
   To fabricate a wholesale rib, the ends of the rib bones are sawn perpendicular to the backbone about 3 to 4 inches below the lateral edge of the loin eye. These rib ends may be made into short ribs or boned for ground meat. The chine bones or vertebrae are then sawed off and the dorsal processes of the thoracic vertebrae are cut out.

5. Remove the neck strap.

   Next, it is imperative to remove the neck strap (neck leader) from the chuck and rib because it is almost entirely connective tissue and inedible.

6. Fabricate the chuck, brisket, and shank.

   The next step is the fabrication of the chuck, brisket, and shank. The first step is to remove the chuck from the shank and brisket by making a cut parallel to the backbone about ½ to 1 inch above the knuckle bone of the humerus with a knife. When this cut is completed, saw through the humerus. The brisket can now be separated from the shank by cutting along the natural seam between the two at the bottom.



CHUCK, BRISKET, SHANK

7. Fabricate the hindquarter.

   After the separating the primals in the front quarter, remove the hindquarter from the hook and place it on a cutting table inside down. The first step in fabricating the hindquarter is the removal of the flank. Start the cut where the flank meets the round. Cut upward following the edge of the round. Then cut toward the front of the carcass and parallel to the loin eye approximately 10 inches from the backbone. When you reach the 13th rib, use a saw to separate the rib bone.

8. Trim kidney and pelvic fat.

   If the kidney and pelvic fat has not been previously removed, trim it away at this time. Give close attention to ensure your knife does not score the tenderloin muscle. Next, remove the hanging tender or diaphragm.

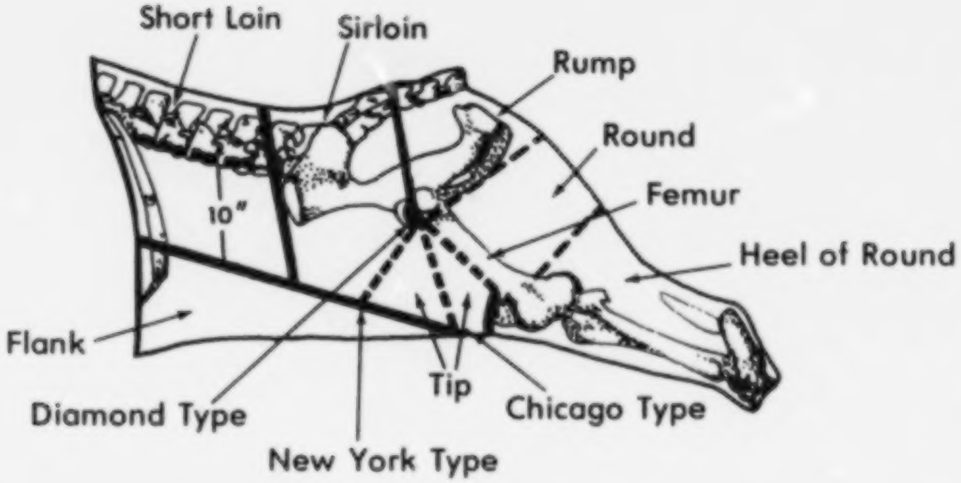
9. Fabricate beef round.

   The beef round varies in methods of fabrication depending on local preference, personal choice, and marketing possibilities. The meat industry generally recognizes three methods of fabricating beef rounds, each varying in the method of cutting the sirloin tip (which is the part of the round forward of the thigh bone in a standing animal).

   The Chicago round is the most common round available on a wholesale basis. As described by IMPS, it is removed by a cut between the last sacral vertebrae and the first caudal vertebrae and passes through a point in front of the forward edge of the aitch bone on out thorough the bottom portion of the hindquarter. If properly done, the ball of the femur is exposed. The problem with this cut is that it divides the sirloin into the loin and the round, thus reducing the value of the sirloin tip.

   Another method of beef round fabrication is the diamond round. This method starts as the Chicago round method does with a cut between the caudal and sacral vertebrae and leaves an exposed femur. Instead of continuing at the same angle, a cut separating the sirloin tip is made which follows the angle of the aitch bone through the flank side of the round. The diamond round produces a more useful round, but is difficult to fabricate without using a power saw.

   The third option is a blend between the other two and is called a New York round. This is produced by cutting through the sacrum and the femur socket in a straight line thus producing a cut without any sirloin tip.


Short Loin
Sirloin
Rump
Round
Femur
Heel of Round
10"
Flank
Diamond Type
Tip
Chicago Type
New York Type

HINDQUARTER

10. After completing all primals cuts, have your instructor evaluate your work.

11. Place all meat cuts in the cooler. Scrape and clean the cutting tables and wash the floor. Clean, sterilize, and put away all equipment.

JOB SHEET 2

FABRICATING CARCASSES AND BOX MEAT

VII

OBJECTIVE 17

Fabricate retail cuts of beef.

INTRODUCTION

Fabrication of wholesale cuts into salable retail cuts is a very complex process. Many factors influence the selection of the most desirable method of fabrication. It is only with extensive experience, knowledge of the market, and a good idea of the characteristics of a particular carcass that this can be done. In most retail businesses today, boxed wholesale cuts are used to fabricate the desired retail cuts.

EQUIPMENT AND SUPPLIES

- Wholesale beef cuts
- Band saw
- Hand saw
- Butcher knife
- Boning knife
- Cutting table
- Packaging material
- Meat grinder
- Scraper

SAFETY

Before you can do this procedure, your instructor must have approved your use of knives and saws. Be sure to follow all safety rules when using this equipment.

PROCEDURE

Fabrication of retail cuts from wholesale cuts depends upon the desired cuts to be fabricated and characteristics of the wholesale cut. In this job sheet, we will be listing multiple methods of fabricating each wholesale cut. Your instructor will inform you regarding the desired method of fabrication for each wholesale cut.

Reading Comprehension Skills
- Gain factual information

Functional Reading Skills
- Follow written instructions

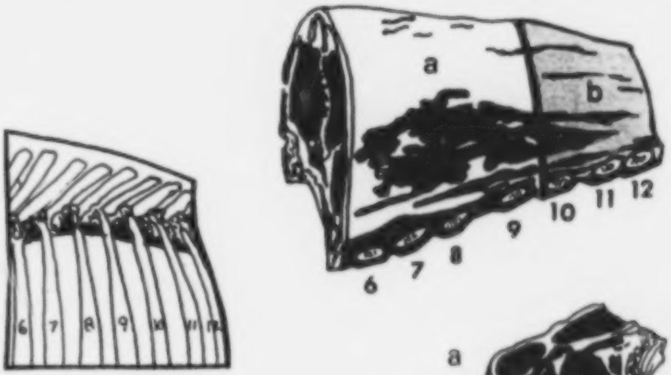
Job Acquisition/ Development Skills

- Master specific job task/procedure
- Apply safety practices/ procedures
- Develop good work habits/ attitudes

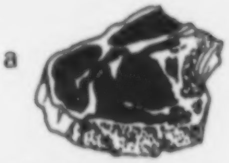
1. Rib

Before fabricating the rib, you must be sure that the neck leader and the cartilage tip of the blade are removed from the large end face. Then, if the short ribs are still attached, they are sawed off with a band saw and the backbone is removed by sawing. Next, depending on the desired method of fabrication, the rib is either band sawed into steaks or roasts. Usually the fat is removed to ¼ inch and boneless cuts are boned out with a knife. The short ribs are divided with a knife or boned for ground beef.

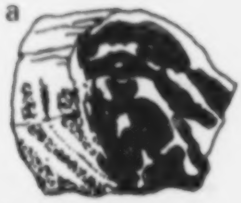
There are only two different methods of fabricating a rib: either cut the ribeye muscle into roasts or slice it into steaks.



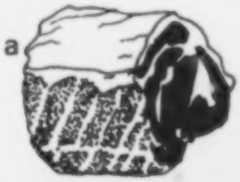
Primal Beef Rib



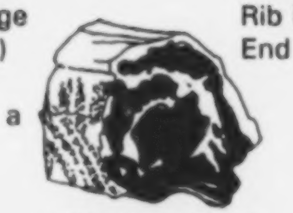
Rib Steak Large End (7th Rib)



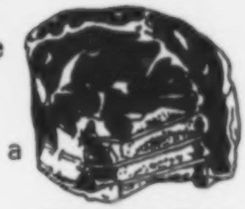
Rib Roast Large End (Ribs 6-7)



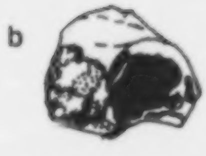
Rib Roast Large End (Ribs 6-8)



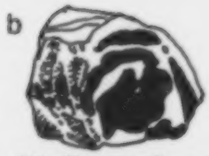
Rib Roast Large End (Ribs 8-9)



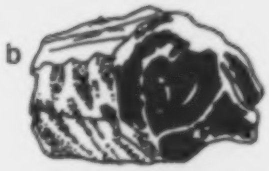
Rib Extra Trim Roast Large End (Ribs 6-8)



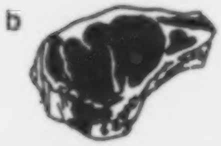
Rib Roast Small End (Ribs 11-12)



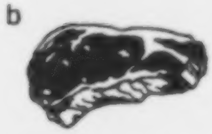
Rib Roast Small End (Ribs 9-10)



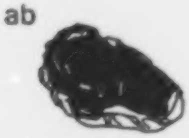
Rib Roast Small End (Ribs 10-12)



Rib Steak Small End BNLS (Ribs 11-12)

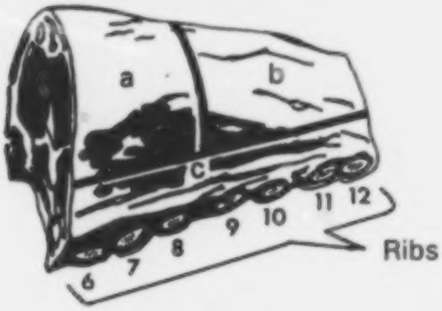


Rib Steak Small End (Ribs 11-12)

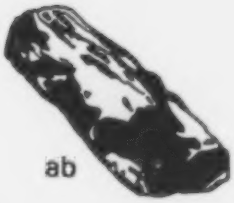


Rib Eye Steak

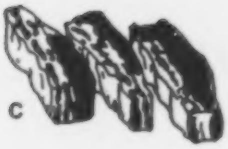
Method No. 2


a
b
c
6
7
8
9
10
11
12
Ribs

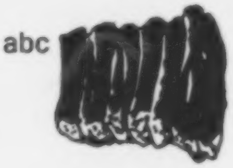
Primal Beef Rib



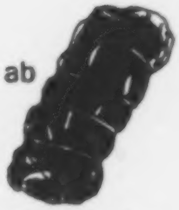
Rib Eye Roast BNLS (Ribs 6-12)



Short Ribs



Back Ribs



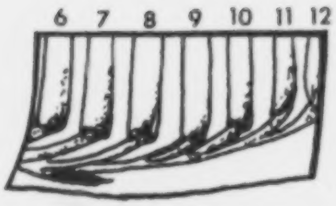
Rolled Cap Pot-Roast

One way to divide the rib into two parts is by band sawing between the 9th and 10th ribs. Then saw between the 7th and 8th ribs. This leaves you with two large-end and one small-end rib roasts. These can be left "bone-in" and trimmed of excess fat or the roast can be boned out and trimmed to be sold as boneless roast. If desired, any of these roasts can be band sawed into large-end or small-end steaks. If the small-end steaks are boned, they are called ribeye steaks.

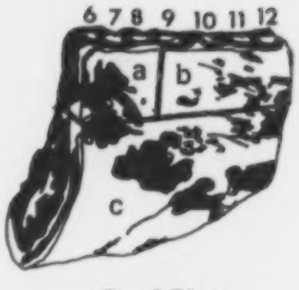
2. Plate

The plate is almost always boned and then ground. If short ribs or spare ribs are desired, they can be fabricated out of the top of the plate and the less desirable bottom half boned for ground beef. Below are the various cuts from the plate.

Method No. 1



Beef Plate



Beef Plate

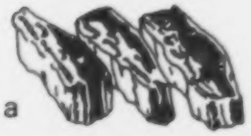


Plate Short Ribs

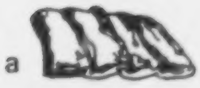


Plate Spare Ribs

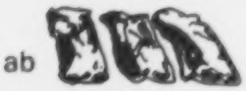
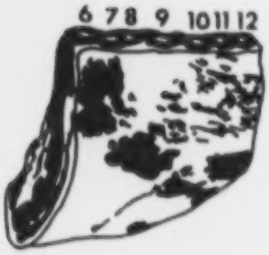


Plate Ribs

Method No. 2



Beef Plate

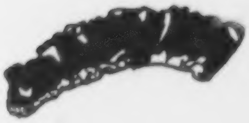


Plate Skirt
Steak BNLS

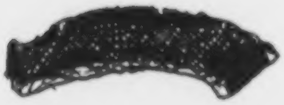


Plate Skirt Steak
Cubed BNLS

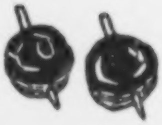


Plate Skirt Steak
Rolls BNLS

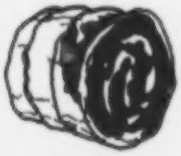


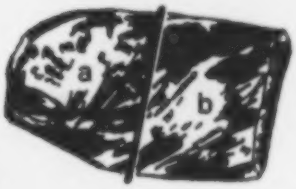
Plate Rolled
BNLS

3. Shank and Brisket

The foreshank is almost always boned and then ground because of the large number of small muscle systems which greatly increase the toughness of the cut. The brisket is usually boned and then divided into two or three pieces. If the shank has not been previously separated from the brisket, this can be done easily by cutting through the natural seam between the two.

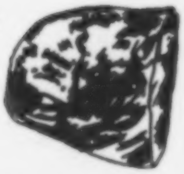
The brisket is first boned by removing the sternum. Next, it is cut into pieces. If it is to be smoked and sold as corned beef, the deckle is removed. Below are three methods of dividing a brisket.

Method No. 1



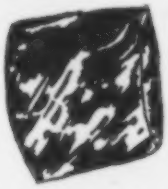
Brisket, BNLS

a



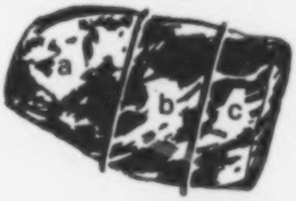
Brisket Point Half BNLS

b



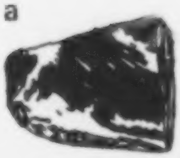
Brisket Flat Cut BNLS

Method No. 2



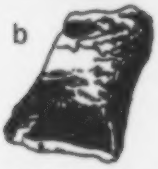
Brisket, BNLS

a



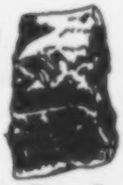
Brisket Point Cut BNLS

b



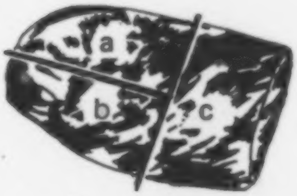
Brisket Middle Cut BNLS

c



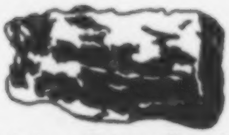
Brisket Flat Cut BNLS

Method No. 3



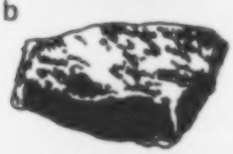
Brisket, BNLS

a



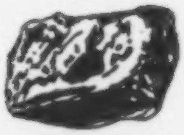
Brisket Edge Cut BNLS

b



Brisket Half Point BNLS

abc

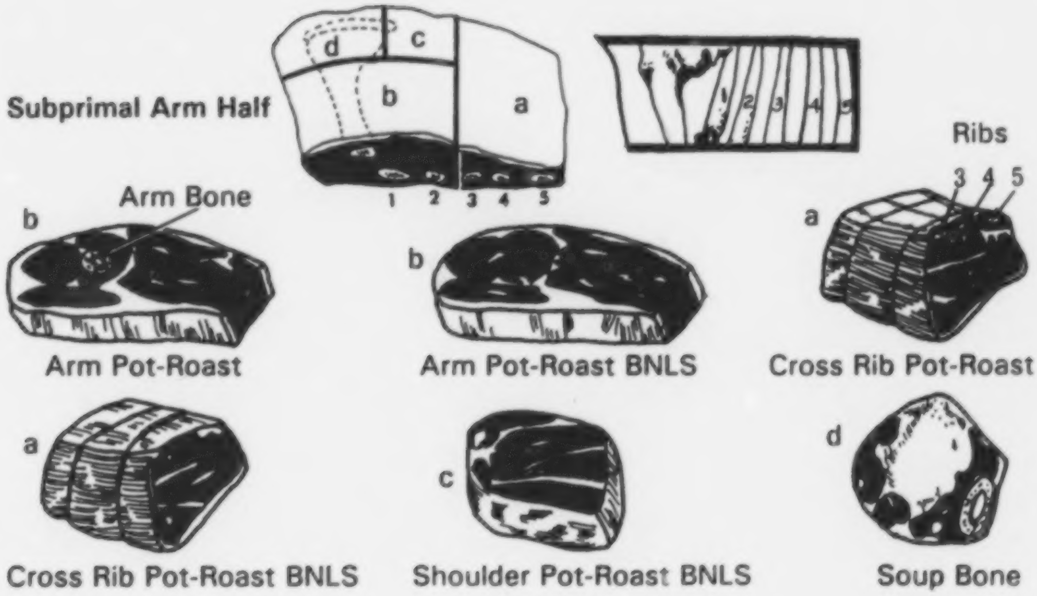


Brisket Corned BNLS

4. Chuck

Because of the numerous muscles and many bones in the chuck, boning is expensive and substantially reduces yield; therefore, most chucks are fabricated bone-in. For institutional markets, the chuck is completely removed and cut into two large roasts, the inside and outside. In most instances, the subprimal arm is first separated from the top of the chuck and fabricated into steaks and roasts. The easiest way to accomplish this is to band saw several arm roasts off the arm end of the chuck. Or one cut can be made parallel to the backbone above the arm joint. Below are the cuts from four different methods for breaking arms.

Method No. 1



Arm Pot-Roast

Arm Pot-Roast BNLS

Cross Rib Pot-Roast

Cross Rib Pot-Roast BNLS

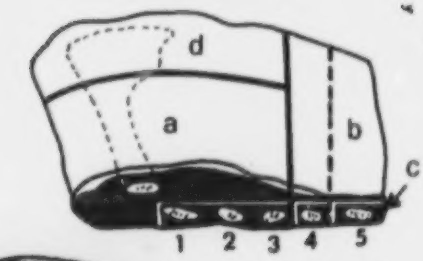
Shoulder Pot-Roast BNLS

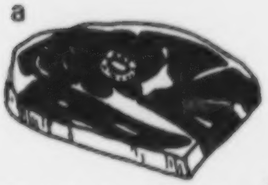
Soup Bone

Method No. 2

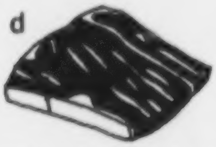
Ribs 1-5 or Ribs 4-5 may be sold as short ribs

Subprimal Arm Half

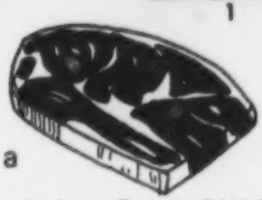




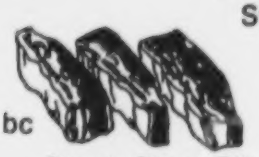
Chuck Arm Steak



Chuck Shoulder Steak BNLS



Chuck Arm Steak BNLS

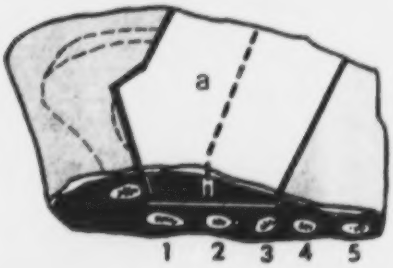


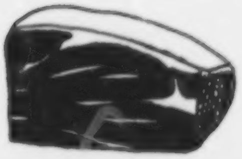
Chuck Short Ribs

Because the large end of the humerus bone is in the top portion of the arm, this piece is usually sliced out and sold as soup bone. The band saw is used to separate the back half of the arm and then the front half is divided by sawing across the arm bone. The bottom half of the front portion of the arm can be band sawed into arm roasts or arm steaks.

Method No. 3

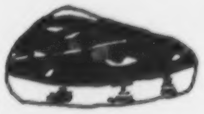
Arm Half



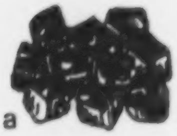


Chuck Shoulder Pot-Roast BNLS (Encourages Cross grain carving)

Chuck Shoulder Pot-Roast BNLS



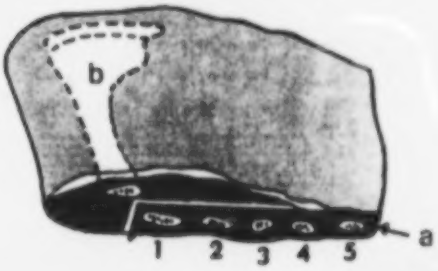
Chuck Shoulder Steak BNLS

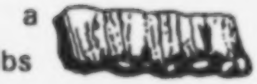


Beef for Stew

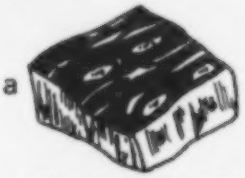
Method No. 4

Arm Half

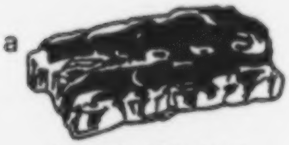




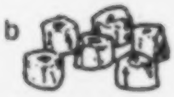
Chuck Flat Ribs



Chuck Short Ribs

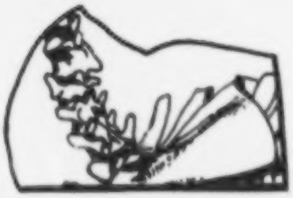


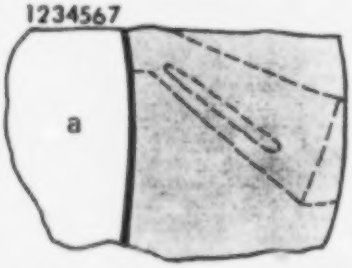
Chuck Flanken
Style Rib



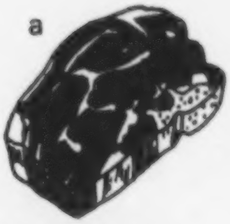
Marrow Bones

The neck, which is attached to the top of the chuck, and the rib bones are removed from the wholesale chuck by trimming them out and sawing across the ribs below the backbone. The neck leader should then be extracted from the top of the chuck. The neck, once removed, can be fabricated as follows:

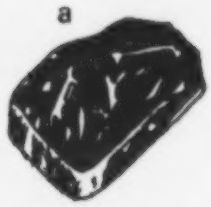




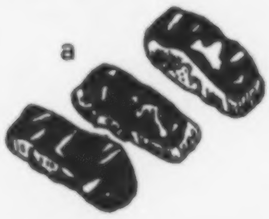
Blade Half



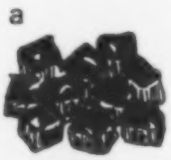
Chuck Neck
Pot-Roast



Chuck Neck
Pot-Roast BNLS



Chuck Neck Bones

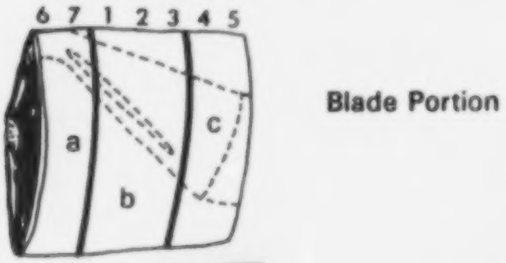


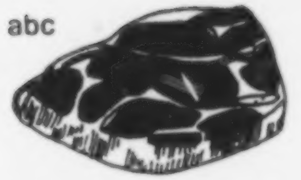
Beef for Stew

The neck is very seldom made into retail cuts, most of the time it is boned and ground.

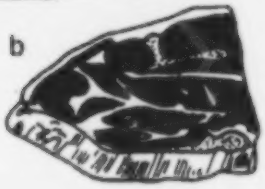
Retail cuts fabricated from the blade portion of the chuck can be separated four ways:

Method No. 1

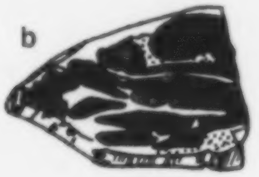

6 7 1 2 3 4 5
a
b
c
Blade Portion



Blade Pot-Roast BNLS

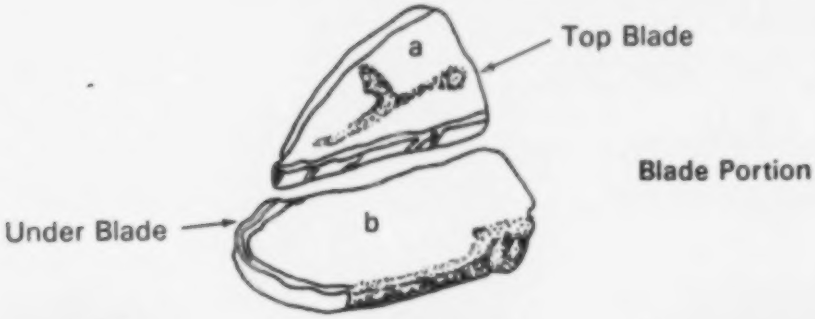


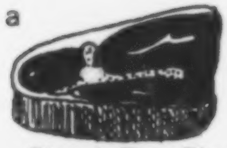
Blade Roast



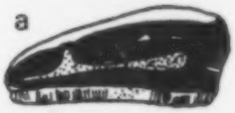
Blade Steak

Method No. 2

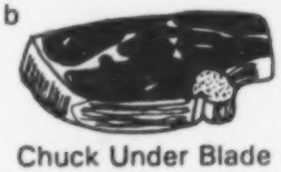

Top Blade
a
Blade Portion
Under Blade
b



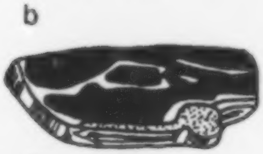
Chuck Top Blade Pot-Roast



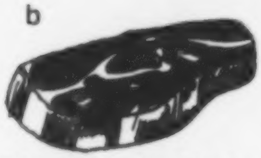
Chuck Top Blade Steak



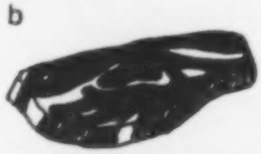
Chuck Under Blade Pot-Roast



Chuck Under Blade Steak



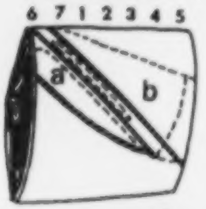
Chuck Under Blade Pot-Roast BNLS

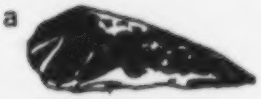


Chuck Under Blade Steak BNLS

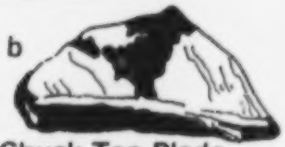
Method No. 3

Blade Portion

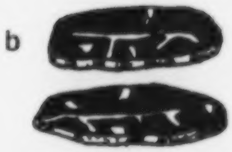




Chuck Mock Tender



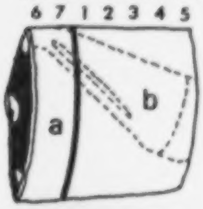
Chuck Top Blade Roast BNLS

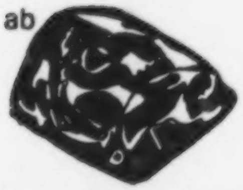


Chuck Top Blade Steak BNLS

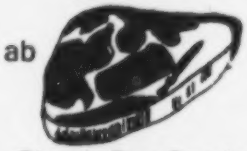
Method No. 4

Blade Portion

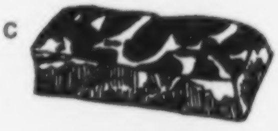




Chuck Eye Roast BNLS



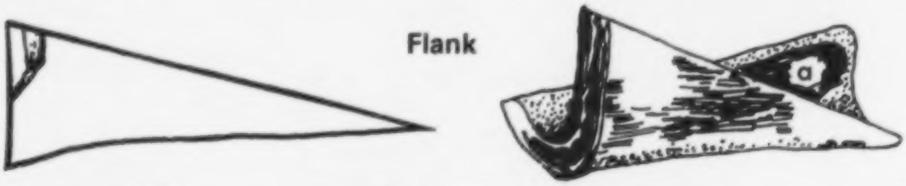
Chuck Eye Steak BNLS

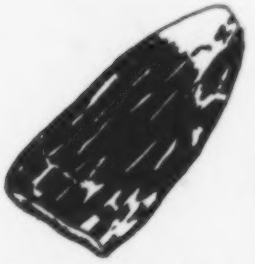


Chuck Eye Edge Pot-Roast

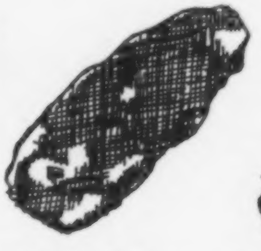
5. Flank

Most processors grind flank into ground beef. Several retail cuts can be produced from the flank if desired.

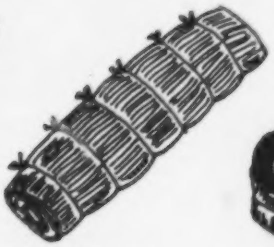




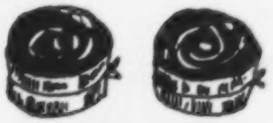
Flank Steak



Flank Steak Cubed



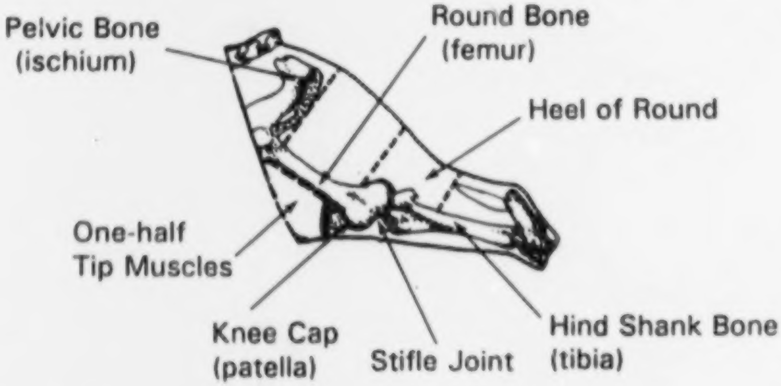
Flank Steak Cubed Rolled



Flank Steak Rolls

6. Round

Due to the different methods of separating the round from the rear quarter, the method of fabricating depends upon the type of round. For the Chicago round with tip attached, which is the most predominant method, the first step is to separate the round into the various subprimal cuts. The Chicago is divided into four subprimal cuts: top round, bottom round, tip, and rump.

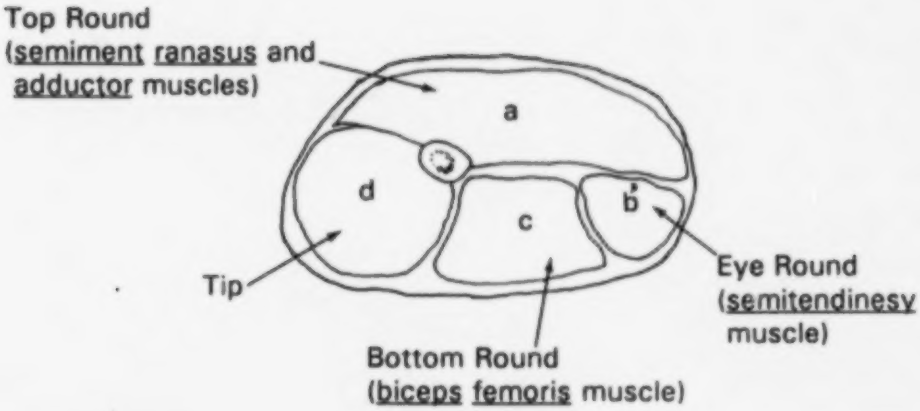


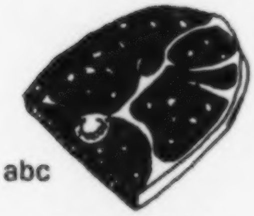
7. Rump

The rump can be divided from the round by sawing parallel to and slightly to the rear of the ischium, down through the femur. The rump can be either prepared bone-in by removing the femur knuckle and trimming to produce a rump roast, or it can be boned and tied or netted to produce a boneless rump roast.

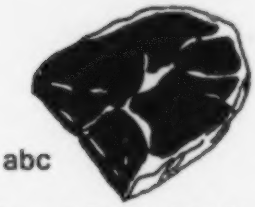
Before the subprimals can be separated, the tibia must be boned out. This is done by cutting along the tibia from the bottom up to the stifle. Using a knife, sever the knee joint and remove the bone. Next, separate the tip by cutting the natural seam between the tip and top round on one side and the tip and the bottom round on the other. When the cut reaches the patella or knee cap, pull the tip away from the knuckle of the femur and cut the connective tissue with a knife. Then remove the knee cap.

Make a cut along the natural seam between the bottom round and the top round down to the large femur bone. Remove the lymph nodes and interstitial fat from the bottom round. Finally, cut the heel of the round away from the bottom round.

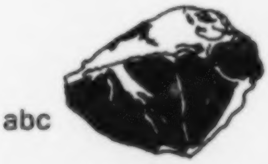

Top Round
(semiment ranasus and
adductor muscles)
a
d
c
b
Tip
Eye Round
(semitendinesy
muscle)
Bottom Round
(biceps femoris muscle)



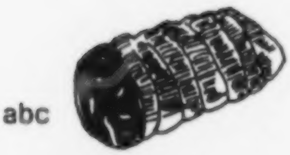
Round Steak



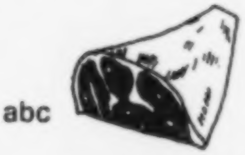
Round Steak BNLS



Rump Roast



Rump Roast BNLS



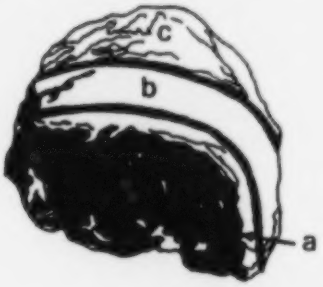
Heel of Round

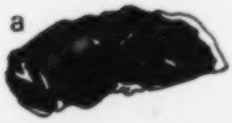
Beef for Stew

The top round is the highest quality portion of the round. It can be fabricated into the following cuts:

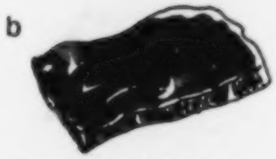
Top Round, Subprimal

The top round is the inside part of the round.

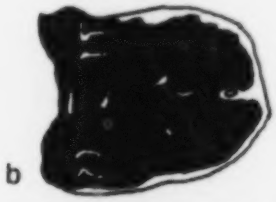




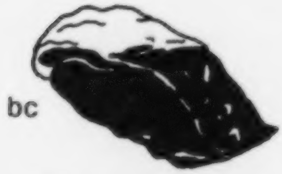
Top Round Steak
Lot Cut



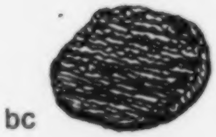
Top Round Steak



Top Round Steak
Butterfly



Top Round Roast



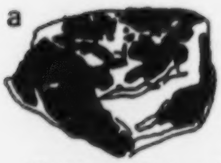
Cubed Steak (Either
Top or Bottom Round)

8. Bottom Round

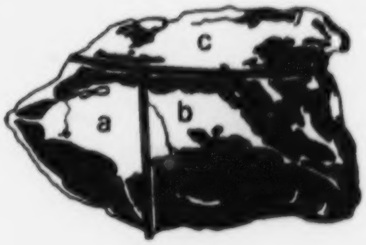
The bottom round, except for the eye of the round, is sometimes too tough to cut into steaks unless they are mechanically tenderized. The bottom round cuts are:

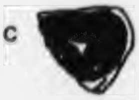
Bottom Round, Subprimal

Eye round is included in this subprimal cut.

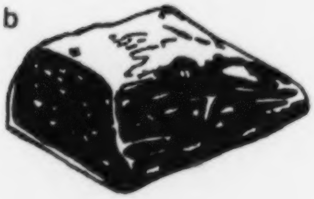


Bottom Round
Rump Roast

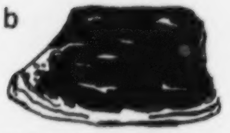




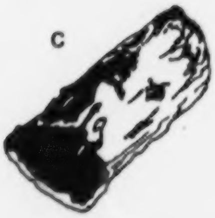
Eye Round Steak



Bottom Round Roast



Bottom Round Steak



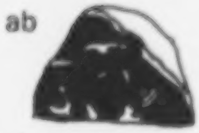
Eye Round Roast

9. Tip

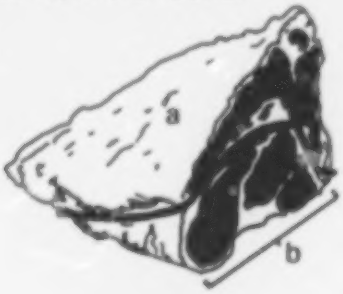
The tip, which varies in size depending on the method of manufacturing the round, is a smaller subprimal cut that can produce these retail cuts:

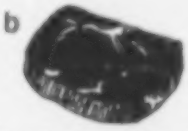
Tip, Subprimal

Tip is a subprimal cut from the round.

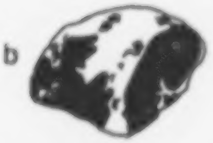


Tip Roast Cap On

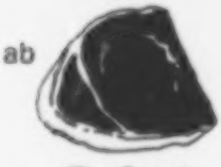




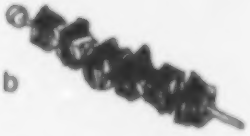
Tip Steak Cap Off



Tip Roast Cap Off



Tip Steak



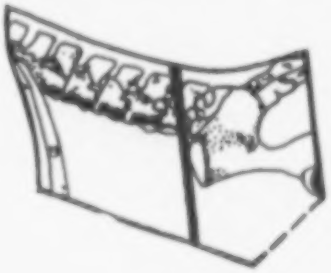
Cubes for Kabobs

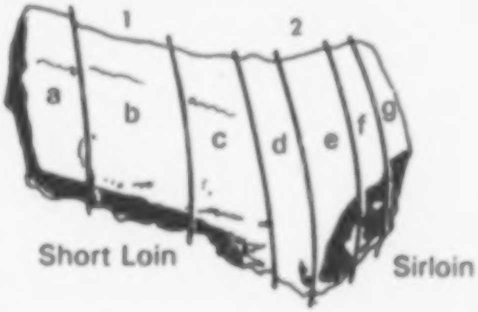
10. Loin

The loin is the most expensive part of the carcass and contains the subprimal sirloin and short loin. If both are to be fabricated into bone-in steaks, the short loin and sirloin are not separated. An alternative method of fabrication is to bone out the entire tenderloin muscle to produce boneless steaks and roasts. The cuts derived from the loin are these:

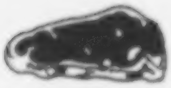
Beef Loin

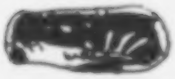
The two subprimal cuts of the loin are the short loin and the sirloin.

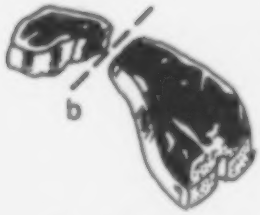




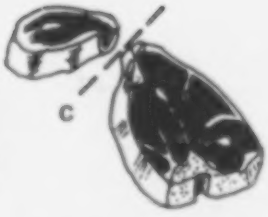
Short Loin, Retail Cuts


Top Loin Steak
a-c


Top Loin
Steak BNLS
a-c

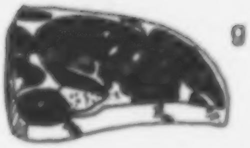


T-Bone Steak

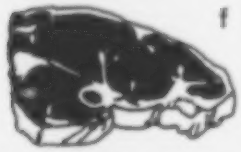


Porterhouse Steak

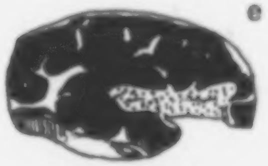
Sirloin, Retail Cuts



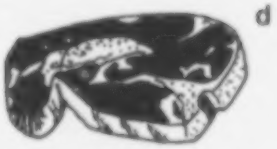
Sirloin Steak
Wedge Bone



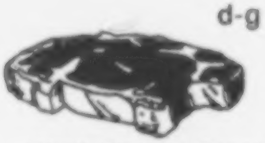
Sirloin Steak
Round Bone



Sirloin Steak
Flat Bone

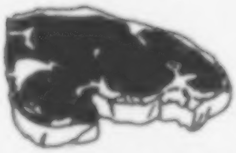


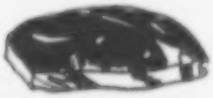
Sirloin Steak
Pin Bone



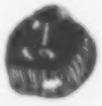
Shell Sirloin Steak

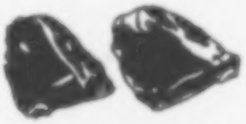
Full Loin, Retail Cuts


Sirloin Steak BNLS


Top Sirloin
Steak BNLS

Tenderloin Roast


Tenderloin Steak


Tenderloin Tips

11. After completing fabrication of the retail cuts, have your instructor evaluate your work.

12. Package all meat in the way designated by your instructor.

13. Place all packaged meat in the cooler.

14. Clean and sanitize your work area and your equipment. Put away your equipment.

JOB SHEET 3 — FABRICATING CARCASSES AND BOX MEAT — VII

OBJECTIVE 18

Break pork into wholesale cuts.

INTRODUCTION

Because of the smaller size of the pork carcass, there are fewer wholesale cuts than in beef. There are basically only two cuts to make to divide a pork carcass.

EQUIPMENT AND SUPPLIES

- Pork carcass
- Butcher knife
- Hand meat saw
- Cutting table
- Scraper

SAFETY

Before you can do this procedure, your instructor must have approved your use of knives and saws. Be sure to follow all safety rules when using this equipment.

PROCEDURE

Pork carcasses come off the slaughter floor cut in two halves or nearly separated with only the plate attached. Usually the hams have been "faced" and the kidney or leaf fat removed. Invariably the skin is left on the carcass unless it is an operation specializing in boning sows and boars.

1. Remove the feet of the carcass.

   This is done by sawing above the hock joint. If the ham is to be cured in a slow, country-type method special care must be taken to cut in the middle of the joint to assure a bone face that is solid bone with no marrow. Open marrow is an ideal place for bacteria to grow during a long curing process thus ruining the ham. Next, the forefoot is removed in the same way. Because of the lack of edible meat on the hind foot, it is not used for human consumption but the front foot is used to make pickled pigs feet or boned and ground into sausage.

Reading Comprehension Skills
- Gain factual information

Functional Reading Skills
- Follow written instructions

Job Acquisition/
Development Skills

- Master specific job task/procedure
- Apply safety practices/ procedures
- Develop good work habits/ attitudes

2. Remove the ham.

The ham, which is the largest single cut on a pork carcass, is removed next. At a point 2 ½ inches forward of the tip of the aitch bone, make a cut perpendicular to the long axis of the ham. This is usually between the third and fourth sacral vertebrae. Use a saw to separate the backbone and then a knife to complete the cut. Care should be taken to prevent damaging the femoral artery during removal. If the femoral artery is too short, it can not be used to pump curing solution into the ham during the curing process. Once the ham is removed, extract the tail bone. Then trim the fat from the flank side and very carefully remove the lymph glands. Skin the ham approximately ¾ of the way from the rump face upward. Then bevel the fat uniformly to approximately ¼ inch at the butt face.

3. Remove the loin.

Removal of the loin is the next step in breaking the carcass. Make a saw cut through the backbone at the third rib. Use a knife to complete the cut at a right angle to the backbone. To separate the loin from the ribs, use a knife to make a cut parallel to the backbone starting below the tenderloin muscle on the sirloin end and cutting forward to the last rib. Then, use a band saw to complete the cut to a point 1-2 inches below the tenderloin on the first rib.

4. Fabricate the rough shoulder.

To fabricate the rough shoulder, first remove the neck bones. When removing the neck bones, remove as little meat as possible, while leaving no cartilage or bone in the shoulder. Next, remove the jowl by making a cut behind the notch, which was made behind the ear when the head was removed. Trim the jowl into a square to be smoked. Remove the clear plate by trimming the fat and skin from the shoulder. If done correctly, the false lean of the trapezius muscle will be exposed. Leave the skin and fat on the front leg.

5. After completing fabrication of the wholesale cuts, have your instructor evaluate your work.

6. Put all meat cuts into the cooler.

7. Clean and sanitize the cutting area and equipment. Put away equipment and supplies.

JOB SHEET 4

FABRICATING CARCASSES AND BOX MEAT

VII

OBJECTIVE 19

Fabricate retail cuts of pork.

INTRODUCTION

Retail cuts fabricated from pork carcasses come fresh or smoked. The fabrication of smoked cuts is the same as fresh cuts. The fabrication of retail cuts are divided according to the wholesale cut from which they are derived.

EQUIPMENT AND SUPPLIES

- Wholesale pork cuts
- Band saw
- Hand saw
- Butcher knife
- Boning knife
- Scraper
- Cutting table

SAFETY

Before you can do this procedure, your instructor must have approved your use of knives and saws. Be sure to follow all safety rules when using this equipment.

PROCEDURE

Because there are various methods of fabricating a primal cut which produce different retail cuts, your instructor will inform you of the method to use on each primal cut. The text presents several different methods of fabrication.

1. Fabricate the ham

   Since almost all hams are smoked, very little fabrication of fresh ham is done. Because of the changes in consumer attitudes, more hams are sold boneless. To bone a ham, remove the skin completely and the trim the fat very closely because fat tends to be much more evident in boneless cuts. After trimming, remove the pelvic bone from the butt portion of the ham. The socket of the pelvic bone and the femur ball must be separated.

Reading Comprehension Skills
- Gain factual information

Functional Reading Skills
- Follow written instructions

Job Acquisition/ Development Skills

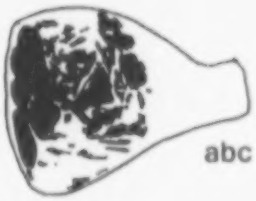
- Master specific job task/procedure
- Apply safety practices/ procedures
- Develop good work habits/ attitudes

After this is accomplished, remove the shank by working the knife through the stifle joint between the thigh bone and the shank bones. After the shank bones are removed, loosen the meat surrounding the femur by sticking the knife in close to the bone from the face of the butt and circling the bone.

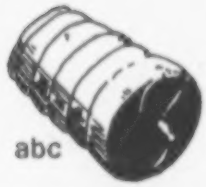
This is referred to as tunnel boning and removes the bone without cutting the outside of the ham. Hams retailed as at least 90 percent fat free must have internal fat removed, so make a cut from the outside following the natural seams in order to remove fat deposits. Next, remove the patella if it did not come out with the femur.

Looking at the hole where the shank bone was removed, locate the popliteal lymph node in the seam between the muscles of the bottom or outside leg of the ham. Remove this node carefully because it is a source of bacterial contamination. And last, net the ham. Various retail cuts that can be extracted from a ham are listed below.

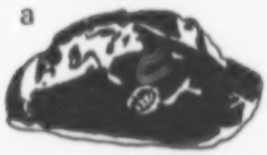
Method No. 1



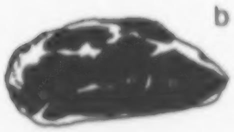
Leg Whole



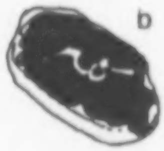
Leg Roast BNLS



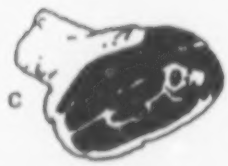
Leg Rump Portion



Leg Center Roast

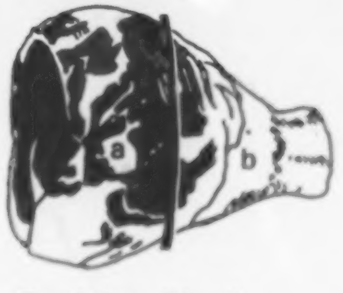


Leg Center Slice

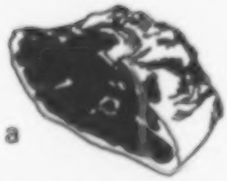


Shank Portion Half

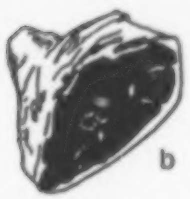
Method No. 2



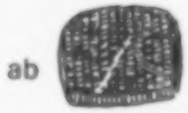
Fresh Leg (Ham)



Leg Rump Half



Leg Shank Half

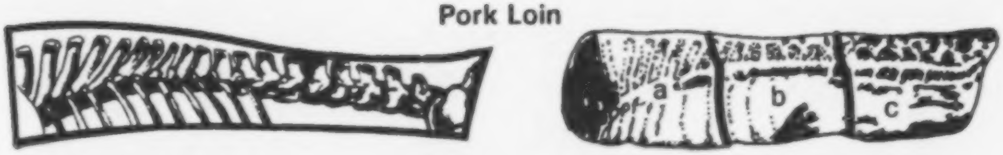


Cubed Steak

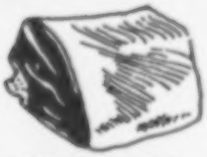
2. Fabricate the loin

   The wholesale loin is first processed by trimming the fat back starting at the blade end of the loin. As in the shoulder, trimming should expose the false lean. Trim backwards to the sirloin end of the loin. Now cut the trimmed loin into roasts or various chops. Boneless chops are produced by first boning out the loin and then cutting it into chops. A butterfly chop is two regular chops in which the cut between the two has not been completely made. When they are laid out with the incomplete cut open, the effective size of the loin is doubled. On the following pages are the various cuts that can be fabricated from the loin.

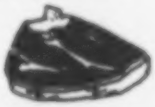
Pork Loin



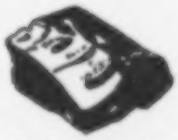
Method No. 1



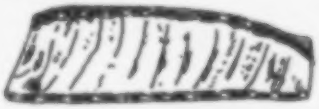
Loin Blade Roast
(5 to 7 ribs)



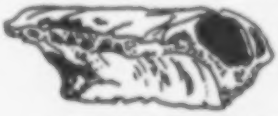
Loin Blade Chop



Loin Country
Style Ribs

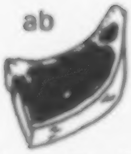


Loin Back Ribs

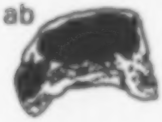


Loin Center Rib Roast

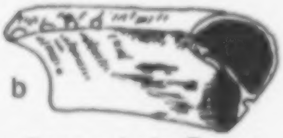
Method No. 2



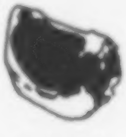
Loin Rib Chop



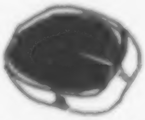
Loin Rib Chop
for Stuffing



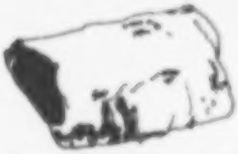
Center Loin Roast



Top Loin Chop

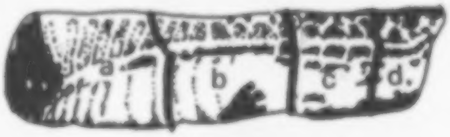


Loin Butterfly Chop

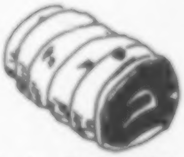


Top Loin Roast BNLS

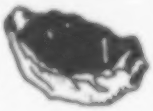
Method No. 3



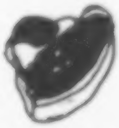
Pork Loin



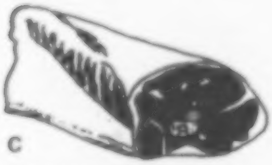
Top Loin Roast BNLS



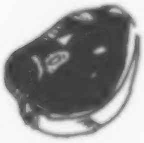
Loin Chop



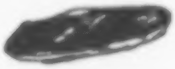
Top Loin Chop BNLS



Sirloin Roast

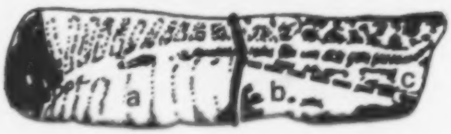


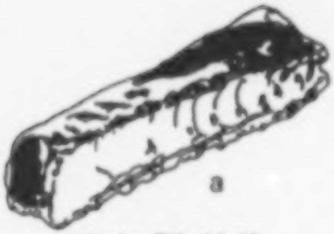
Sirloin Chop



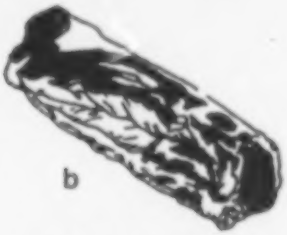
Sirloin Cutlet

Method No. 4

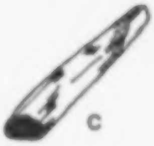




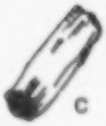
Loin Rib Half



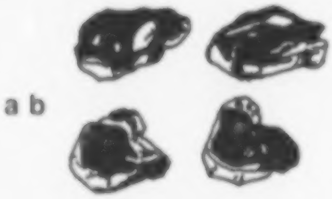
Loin Sirloin Half



Tenderloin Whole



Tipless Tenderloin

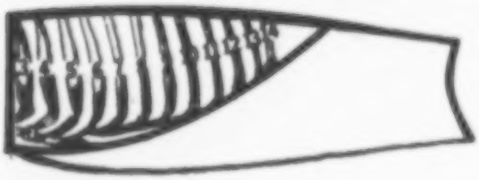


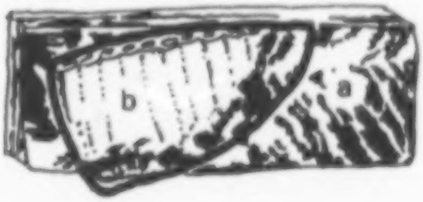
Assorted Chops

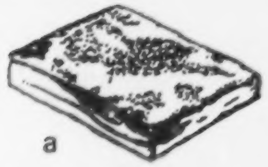
3. Fabricate the belly and side

When removing spareribs, bone out the ribs leaving as little meat as possible on them. Be sure that all traces of the sternum are also removed. After removing the spareribs, square the belly up and make sure that no trace of the teats remain on the belly.

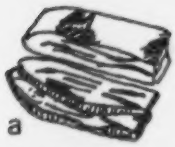
Pork Belly and Spareribs



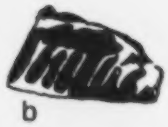




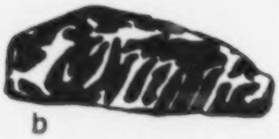
Fresh Side Pork



Fresh Side Pork Sliced



Spareribs Breast Bone Off

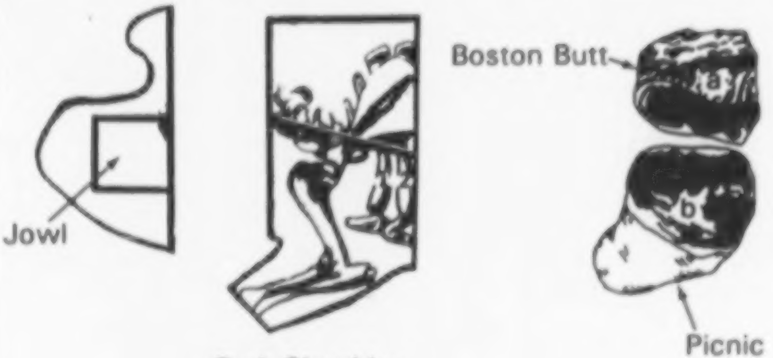


Spareribs

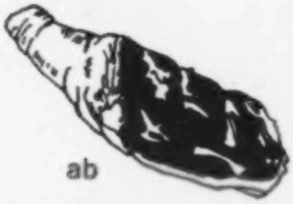
4. Fabricate the whole shoulder

The shoulder may be cured or used fresh. It contains two subprimal cuts, the blade Boston and the picnic. Separate the blade Boston from the picnic by cutting at right angles to the long axis of the shoulder about one inch below the exposed blade bone. The cut is first made with a knife and then with a saw to separate the bone. The retail cuts derived from the shoulder are shown below.

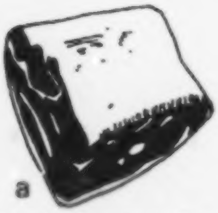
Pork Shoulder



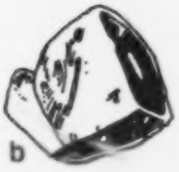
Pork Shoulder (Clear Plate Removed)



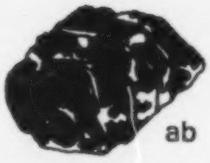
Pork Shoulder Whole



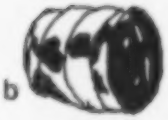
Blade Boston Roast



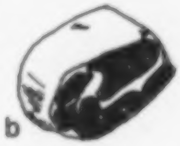
Arm Picnic



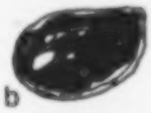
Shoulder Roast BNLS



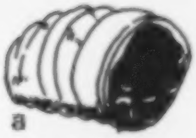
Arm Picnic BNLS



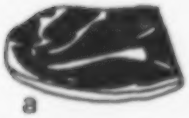
Arm Roast



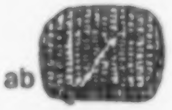
Arm Steak



Blade Boston Roast BNLS

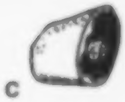


Blade Steak



Pork Cubed Steak

Pork Cubed for Kabobs



Pork Hock

5. After completing fabrication, have your instructor evaluate your work.

6. Package meat and return it to the cooler.

7. Clean and sanitize your work area and your equipment. Put away your equipment.

JOB SHEET 5 — FABRICATING CARCASSES AND BOX MEAT — VII

OBJECTIVE 20

Break lamb into wholesale cuts.

INTRODUCTION

Lamb carcasses only average about 65 lbs. and cut sizes are much smaller than pork or beef. This difference in size affects the method of breaking the carcass. Unlike pork or beef, lamb carcasses are broken whole so that both sides of the carcass stay in the same wholesale cut.

EQUIPMENT AND SUPPLIES

- Lamb carcass
- Butcher knife
- Hand saw
- Band saw
- Cutting table
- Scraper

SAFETY

Before you can do this procedure, your instructor must have approved your use of knives and saws. Be sure to follow all safety rules when using this equipment.

PROCEDURE

Reading Comprehension Skills
- Gain factual information

Functional Reading Skills
- Follow written instructions

1. Separate the hindsaddle and foresaddle.

   Look into the thoracic cavity, count the ribs, and stick a knife close to the loin eye, between the 12th and 13th ribs. From the outside, place the knife back in the cut and directing it downward, split one side of the carcass to the midline. Repeat the same cut on the opposite side leaving only the backbone attached. Use a saw to separate the backbone or with skill, stick a knife between the vertebrae, severing the backbone.

2. Remove the hindsaddle

   Measure the width of the loin eye. Then make a lateral mark below the loin eye at a distance equal to half the width of the loin eye. From that point, make a cut back toward the leg and out. Remove the kidneys and extract the kidney fat. The largest wholesale cut of lamb is the leg which comprises ⅓ of the carcass weight.

Job Acquisition/ Development Skills

- Master specific job task/procedure
- Apply safety practices/ procedures
- Develop good work habits/ attitudes

The legs are cut with the sirloin attached. To separate the legs, use a knife to make a cut through the muscle on either side of the backbone directly in front of the pelvis. Then saw the backbone to sever the leg from the loin. In a young animal the aitch bone attaching the two legs can be split with a knife since the aitch bone is cartilage at this time. In older animals, a saw must be used.

Next, use a saw to split the backbone in the sirloin to separate the two legs. Depending upon the method of fabrication used, the loin can be split length-wise or left whole. Some cuts called "doubled" or "kidney chops" contain both loin eyes.

3. Remove the foresaddle

   Remove the flank and breast by sawing through the arm bone at a point slightly above the knuckle and cutting rearward through the ribs parallel to the backbone. Sever the neck from the foresaddle by using a saw to separate the backbone. Cut the neck on a line perpendicular to the neck. Separate the shoulder and the rack by sawing between the 5th and 6th ribs. The shoulders are then separated by sawing down the backbone to produce two square cut shoulders. Preparation of the rack begins with division of the riblets from the loin muscle. Start by sawing with a band saw approximately half of the width of the loin eye down from the loin, parallel to the backbone. Make the same cut on both sides leaving a square cut double rib. If rib chops are desired, then the rack can be split with a band saw to produce single racks.

4. After completing breaking of the wholesale cuts, have your instructor evaluate your work.

5. Return all meat to the cooler.

6. Clean your equipment and area.

7. Put away equipment and supplies.

JOB SHEET 6

FABRICATING CARCASSES AND BOX MEAT

VII

OBJECTIVE 20

Fabricate retail cuts of lamb.

INTRODUCTION

Because of the size of lamb carcasses, fabricators tend to make up for small portions by making double chops. Chops are so named because they are cuts which a butcher could separate using a knife and cleaver. Steaks are cuts which require a saw to sever. Retail cuts are identified by the wholesale cut from which they are derived:

EQUIPMENT AND SUPPLIES

- Wholesale lamb cuts
- Band saw
- Hand saw
- Butcher knife
- Scraper
- Cutting table

SAFETY

Before you can do this procedure, your instructor must have approved your use of knives and saws. Be sure to follow all safety rules when using this equipment.

PROCEDURE

Reading Comprehension Skills
- Gain factual information

Functional Reading Skills
- Follow written instructions

1. Leg

   To fabricate a retail leg from a wholesale leg, remove the tail and pelvic fat. Trim the outside of the leg, leaving no more than ¼ inch of fat. Do not remove the fell, unless absolutely necessary for trimming because of it's importance in retaining moisture and juices during cooking. The method of fabrication of the shanks depends upon the type of leg desired — Frenched, American, or boneless.

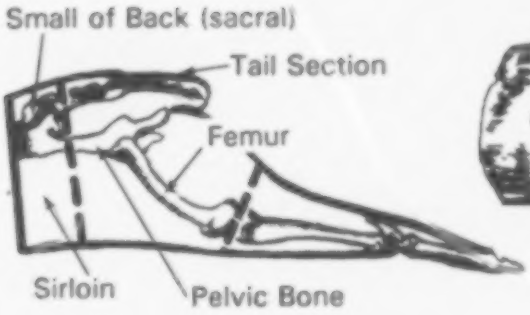
   To prepare a Frenched leg, sever the achilles tendon at the base of the shank. Sever the muscle 1 ½ inches above the back and pull it away from the bone. Directly above the hock is the break joint which can easily be broken by working with a knife and forcing it backwards to remove the hock. Any cut which has an exposed bone is called Frenched.

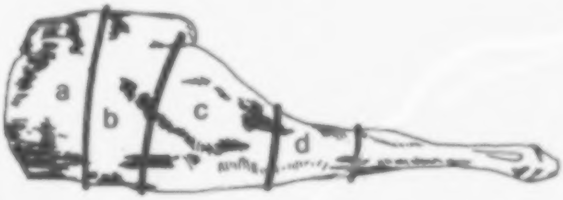
Job Acquisition/
Development Skills
- Master specific job task/procedure
- Apply safety practices/ procedures
- Develop good work habits/ attitudes

The American leg is processed by loosening the shank muscle and achilles tendon the same as in the Frenched leg. Next, from the back insert a knife into the stifle joint, or where the shank meets the femur, to loosen the shank bone. Remove the shank bone from the bottom of the leg. Leave the patella. Fold the shank muscle end back and insert it in the hole left by the shank bone.

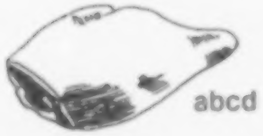
A leg can be boned by first removing the pelvic bone. Insert a knife into the slip joint (sacroiliac) and remove the backbone by pulling forward. Use a knife to separate the pelvic bone from the inside surface of the leg. Then, break it loose from the femur. Remove the shank at the stifle the same way as in the American leg. Starting at the inside end of the femur, cut the femur loose from the inside of the leg. Pull the femur out the shank end without cutting through any muscles in the leg. Remove the popliteal lymph node and surrounding fat between the bottom muscle and the eye muscle in the bottom end of the leg. The boneless leg can be tied or netted to make cooking easier.

The leg can also be cut into small roasts or sliced into steaks. The retail cuts and their proper names are listed below.

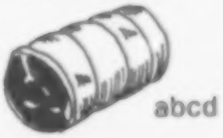




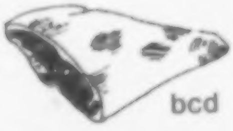
Method No. 1



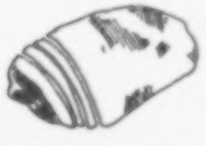
Leg Whole

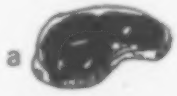


Leg Roast BNLS

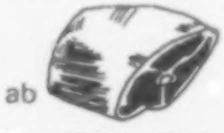


Leg Shortcut
Sirloin Off


Leg Combination

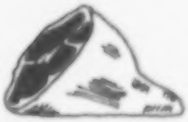


Sirloin Chop



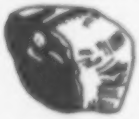
Leg Sirloin Half

Method No. 2



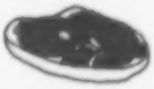
cd

Leg Shank Half



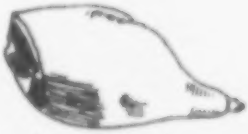
bc

Leg Center Roast



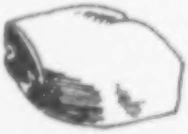
c

Leg Center Slice



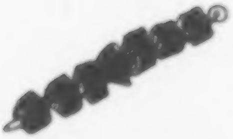
abcd

Leg French
Style Roast

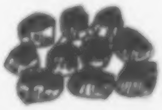


abcd

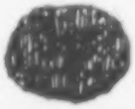
Leg American
Style Roast



Cubes for Kabobs



Stew Meat

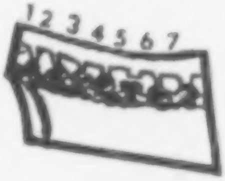


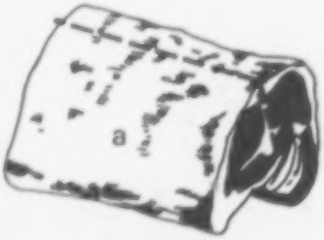
c

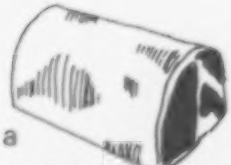
Cubed Steak

2. Loin

The loin can either be split to fabricate two trim loins or left whole to make a double roast or double chops. Boneless loin chops or double loin chops can be fabricated by removing the lumbar vertebrae. The various cuts available from the loin are listed below.

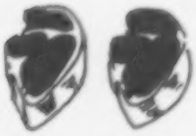






a

Loin Roast



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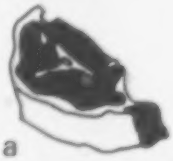
Loin Chops



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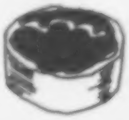
Loin Double Chop



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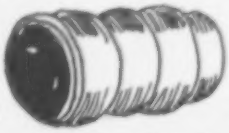
Loin Double Chop BNLS

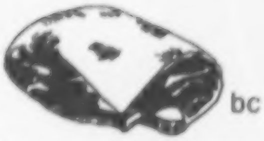


a

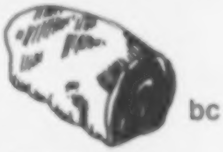
Loin Double Roast BNLS

3. Shoulder

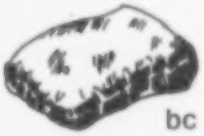
A square cut shoulder can be sold whole, boneless, or cut into smaller portions. One unusual cut made from the shoulder is called a Saratoga roll. Basically, this is a boneless blade chop which is rolled tightly in a spiral and pinned with a skewer. The three alternatives for shoulder fabrication and the cuts derived are shown below.



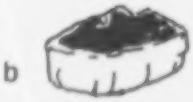
Square Cut Whole



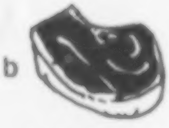
Roast BNLS



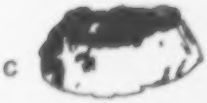
Cushion Roast BNLS



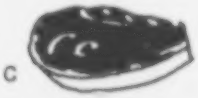
Blade Roast



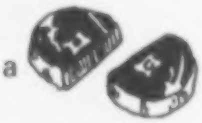
Blade Chop



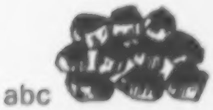
Arm Roast



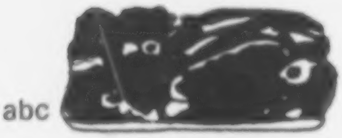
Arm Chop



Neck Slices



Stew Meat



Combination

Cubes for Kabobs

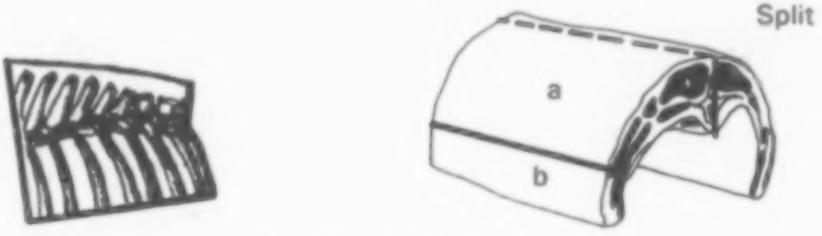
4. Neck

The neck may be sawed into neck slices or the meat can be removed and ground.

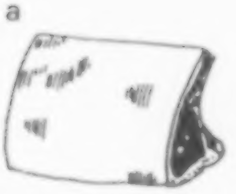
5. Rack

The rack can either be split or left whole to produce chops, roasts, or riblets. One interesting cut made from the rack is a rib crown roast. A crown roast is produced by using a double rack with as much rib left as possible. The chine bones are loosened by severing the inside rib connections with a saw and then removed along with the feather bones. The fell and outside fat are not broken as the chine bones are removed. The top 2-3 inches are trimmed of all fat and muscle leaving completely bare ribs.

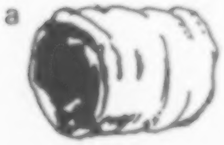
The two sides are then flipped over backwards so that the fell from both halves is touching. The roast is rolled into a circle and tied using a needle and heavy butcher string. This leaves a circular cut with the curved rib bones extending out away from the roast in the appearance of the crown. The different cuts from the rack are listed below.



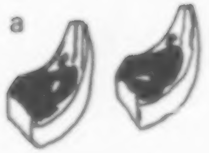
Rib or Hotel Rack



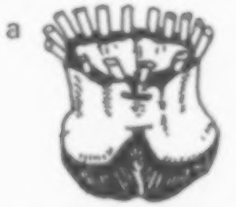
Rib Roast



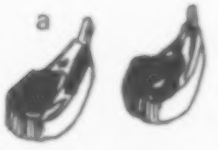
Rib Roast BNLS



Rib Chops



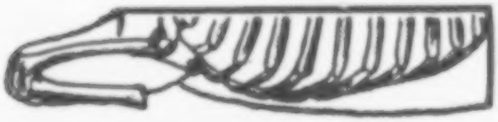
Rib Crown Roast

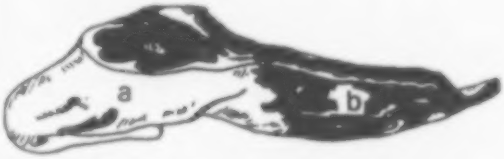


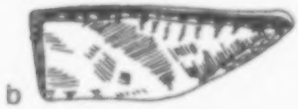
Rib French Chops

6. Foreshank and Breast

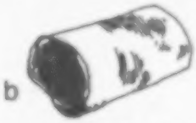
The various combinations of cuts which can be fabricated from the foreshank and breast are shown below.



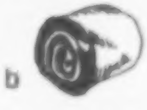




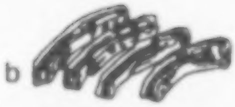
Breast



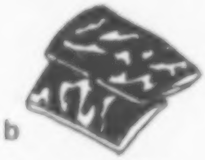
Breast for Stuffing



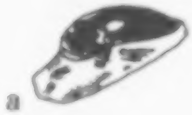
Breast Rolled



Breast Riblets



Breasts Ribs



Shank

7. After completing fabrication, have your instructor evaluate your work.

8. Package meat and return it to the cooler.

9. Clean up your area and equipment.

10. Put away all equipment and supplies.

JOB SHEET 7

Development of:
READING SKILLS
EMPLOYABILITY SKILLS

- Introduce the assignment to the students by discussing why reading and employability skills are important.

- Discuss with them the following skills which are relevant to this task:

  READING SKILLS

  — Following written instructions

  EMPLOYABILITY SKILLS

  — Mastering specific job task/procedure

  — Developing good work habits/attitudes

- For additional suggestions on teaching basic skills, refer to Instructional Supplements 1 and 2.

JOB SHEET 7 — FABRICATING CARCASSES AND BOX MEAT — VII

OBJECTIVE 22

Scrape meat cuts.

INTRODUCTION

When meat is cut with a hand saw or a band saw, minute particles of meat and bone are deposited on the cut surfaces of the meat. This detracts from the attractiveness of the cut and the bone chips are unpleasant to consumers. To correct this, meat cuts must be scraped on both sides with a scraper to remove this residue.

EQUIPMENT AND SUPPLIES

- Cutting table
- Scraper
- Meat cuts

PROCEDURE

1. Using meat that has been freshly cut with a band saw, use the scraper to scrape all of the area on both sides to remove bone and meat dust.

   NOTE: Use minimum pressure during the scraping process to prevent damage to meat.

2. After the job is completed, have your instructor evaluate your work.
3. Package the meat and return it to the cooler.
4. Clean up your table and scraper.
5. Put away the scraper.

Functional Reading Skills
- Follow written instructions

Job Acquisition/ Development Skills
- Master specific job task/procedure
- Apply safety practices/ procedures
- Develop good work habits/ attitudes

JOB SHEET 8

Development of:
READING SKILLS
EMPLOYABILITY SKILLS

- Introduce the assignment to the students by discussing why reading and employability skills are important.
- Discuss with them the following skills which are relevant to this task:

  READING SKILLS

  — Following written instructions

  EMPLOYABILITY SKILLS

  — Mastering specific job task/procedure

  — Applying safety practices/procedures

  — Developing good work habits/attitudes

- For additional suggestions on teaching basic skills, refer to Instructional Supplement 2.

JOB SHEET 8

FABRICATING CARCASSES AND BOX MEAT

VII

OBJECTIVE 23

Tenderize meat.

INTRODUCTION

Mechanical tenderizers are used to convert meat too tough for most uses into a product that is more acceptable to the consumer.

WARNING: Mechanical tenderizers and cubing machines contain parts that have the potential for serious injury. Always make certain that safety shields are in place and that you follow the safety rules provided by your instructor.

EQUIPMENT AND SUPPLIES

- Fresh meat cuts
- Mechanical tenderizers

PROCEDURE

To tenderize meat cuts effectively, the meat must be cut into a size that will pass through the tenderizer, preferably across the grain.

1. To tenderize meat, turn the machine on and run the cut through the slot leading to the knife rollers. As you place the meat in the slot, allow the rollers to catch the meat then let go so the machine can pull the meat in. Catch the cut on the other side as it comes out. If the cut is unusually tough, you can run it through the machine again by turning it at a 90 degree angle to the previous pass.
2. Allow your instructor to evaluate your work after you have completed the assignment.
3. Return all meat to the cooler.
4. Clean your equipment and area.
5. Put away equipment and supplies.

Functional Reading Skills
- Follow written instructions

Job Acquisition/ Development Skills
- Master specific job task/procedure
- Apply safety practices/ procedures
- Develop good work habits/ attitudes

JOB SHEET 1

Break beef into wholesale cuts.

Student's name ______________________ Date ____________

Evaluator's name ______________________ Attempt no. ______

Instructions: When you are ready to perform this task ask your instructor to observe the procedure and complete this form. All items listed under "Process Evaluation" must receive a "Yes" for you to receive an overall performance evaluation.

PROCESS EVALUATION

Evaluator note: Write a check mark in the "Yes" or "No" blanks to designate whether or not the student has satisfactorily achieved each step in this procedure. If the student is unable to achieve this competency, have the student review the materials and try again.

The student:	Yes	No
1. Correctly followed safety procedures.	____	____
2. Identified all cut lines.	____	____
3. Made all cuts at the correct angle.	____	____
4. Placed all meat cuts in the cooler.	____	____
5. Put away tools and cleaned work area.	____	____

EVALUATOR'S COMMENTS

____

____

____

PRODUCT EVALUATION

Evaluator note: Rate the student on the following criteria by circling the appropriate numbers. Each criterion must receive a rating of "3" or higher to demonstrate student mastery. (See Performance Evaluation Key.) A student who is unable to demonstrate mastery should review the material and submit another product for evaluation.

Criteria:

Separating forequarter:	Identified cut lines correctly, made smooth cuts, cut at correct angles.	4	3	2	1
Separating hindquarter:	Identified cut lines correctly, made smooth cuts, cut at correct angles.	4	3	2	1
General procedure:	Correctly cleaned area and equipment and followed all safety rules.	4	3	2	1

EVALUATOR'S COMMENTS

AVERAGE RATING

Evaluator note: To obtain an average rating for the competency profile, total the designated points in "Product Evaluation" and divide by the total number of criteria. Circle the rating on the "Performance Evaluation Key" below.

PERFORMANCE EVALUATION KEY

4 **Skilled** - Can perform job with no additional training
3 **Moderately Skilled** - Has performed job during training program; limited additional training may be required
2 **Limited Skill** - Has performed job during training program; additional training is required to develop skill
1 **Unskilled** - Is familiar with process, but is unable to perform job

JOB SHEET 2

Fabricate retail cuts of beef.

Student's name ____________________ Date __________

Evaluator's name ____________________ Attempt no. ____

Instructions: When you are ready to perform this task ask your instructor to observe the procedure and complete this form. All items listed under "Process Evaluation" must receive a "Yes" for you to receive an overall performance evaluation.

PROCESS EVALUATION

Evaluator note: Write a check mark in the "Yes" or "No" blanks to designate whether or not the student has satisfactorily achieved each step in this procedure. If the student is unable to achieve this competency, have the student review the materials and try again.

The student:	Yes	No
1. Correctly followed safety procedures.	____	____
2. Identified all cut lines.	____	____
3. Cut steaks and roasts to the proper thickness.	____	____
4. Left a minimum amount of meat on the bone when boning.	____	____
5. Made all cuts at the correct angle.	____	____
6. Correctly trimmed all cuts.	____	____
7. Placed all packaged meat in cooler.	____	____
8. Put away tools and cleaned work area.	____	____

EVALUATOR'S COMMENTS

____

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____

PRODUCT EVALUATION

Evaluator note: Rate the student on the following criteria by circling the appropriate numbers. Each criterion must receive a rating of "3" or higher to demonstrate student mastery. (See Performance Evaluation Key.) A student who is unable to demonstrate mastery should review the material and submit another product for evaluation.

Criteria:

Separating forequarter:	Identified cut lines correctly, made smooth cuts, cut at correct angles.	4	3	2	1
Separating hindquarter:	Identified cut lines correctly, made smooth cuts, cut at correct angles.	4	3	2	1
General procedure:	Correctly cleaned area and equipment and followed all safety rules.	4	3	2	1

EVALUATOR'S COMMENTS

AVERAGE RATING

Evaluator note: To obtain an average rating for the competency profile, total the designated points in "Product Evaluation" and divide by the total number of criteria. Circle the rating on the "Performance Evaluation Key" below.

PERFORMANCE EVALUATION KEY

4 **Skilled** - Can perform job with no additional training

3 **Moderately Skilled** - Has performed job during training program; limited additional training may be required

2 **Limited Skill** - Has performed job during training program; additional training is required to develop skill

1 **Unskilled** - Is familiar with process, but is unable to perform job

PRACTICAL TEST 3

FABRICATING CARCASSES AND BOX MEAT

VII

JOB SHEET 3

Break pork into wholesale cuts.

Student's name ______________________ Date __________

Evaluator's name ______________________ Attempt no. ______

Instructions: When you are ready to perform this task ask your instructor to observe the procedure and complete this form. All items listed under "Process Evaluation" must receive a "Yes" for you to receive an overall performance evaluation.

PROCESS EVALUATION

Evaluator note: Write a check mark in the "Yes" or "No" blanks to designate whether or not the student has satisfactorily achieved each step in this procedure. If the student is unable to achieve this competency, have the student review the materials and try again.

The student:	Yes	No
1. Correctly followed safety procedures	____	____
2. Correctly removed the feet.	____	____
3. Separated ham between the third and fourth sacral vertebrae.	____	____
4. Made square smooth cut across loin eye.	____	____
5. Sawed between rib and the shoulder at the correct angle.	____	____
6. Correctly removed neck bones.	____	____
7. Followed notch to remove jowl.	____	____
8. Removed clear plate correctly.	____	____
9. Correctly trimmed all cuts.	____	____
10. Placed all meat cuts in the cooler.	____	____
11. Put away tools and cleaned work area.	____	____

EVALUATOR'S COMMENTS

PRODUCT EVALUATION

Evaluator note: Rate the student on the following criteria by circling the appropriate numbers. Each criterion must receive a rating of "3" or higher to demonstrate student mastery. (See Performance Evaluation Key.) A student who is unable to demonstrate mastery should review the material and submit another product for evaluation.

Criteria:

Separated ham:	Identified cut lines correctly, made smooth cuts, cut at correct angles, cut femoral artery at proper length.	4	3	2	1
Cut Loin:	Identified cut lines with no errors, made smooth cuts, cut at correct angles, properly trimmed fat back.	4	3	2	1
General procedure:	Correctly cleaned area and equipment and followed all safety rules.	4	3	2	1

EVALUATOR'S COMMENTS

____

____

____

AVERAGE RATING

Evaluator note: To obtain an average rating for the competency profile, total the designated points in "Product Evaluation" and divide by the total number of criteria. Circle the rating on the "Performance Evaluation Key" below.

PERFORMANCE EVALUATION KEY

4 **Skilled** - Can perform job with no additional training

3 **Moderately Skilled** - Has performed job during training program; limited additional training may be required

2 **Limited Skill** - Has performed job during training program; additional training is required to develop skill

1 **Unskilled** - Is familiar with process, but is unable to perform job

PRACTICAL TEST 4

JOB SHEET 4

Fabricate retail cuts of pork.

Student's name ____________________ Date ____________

Evaluator's name ____________________ Attempt no. ________

Instructions: When you are ready to perform this task ask your instructor to observe the procedure and complete this form. All items listed under "Process Evaluation" must receive a "Yes" for you to receive an overall performance evaluation.

PROCESS EVALUATION

Evaluator note: Write a check mark in the "Yes" or "No" blanks to designate whether or not the student has satisfactorily achieved each step in this procedure. If the student is unable to achieve this competency, have the student review the materials and try again.

The student:	Yes	No
1. Correctly followed all safety procedures.	____	____
2. Identified all cut lines.	____	____
3. Cut steaks and roasts to the proper thickness.	____	____
4. Left a minimum amount of meat on the bone when boning.	____	____
5. Made all cuts at the correct angle.	____	____
6. Correctly trimmed all cuts.	____	____
7. Put away tools and cleaned work area.	____	____

EVALUATOR'S COMMENTS

____

____

____

PRODUCT EVALUATION

Evaluator note: Rate the student on the following criteria by circling the appropriate numbers. Each criterion must receive a rating of "3" or higher to demonstrate student mastery. (See Performance Evaluation Key.) A student who is unable to demonstrate mastery should review the material and submit another product for evaluation.

Criteria:

Subprimal cuts:	Identified cut lines correctly, made smooth cuts, cut at correct angles.	4	3	2	1
Cut Loin:	Identified cut lines with no errors, made smooth cuts, cut at correct angles, properly trimmed fat back.	4	3	2	1
General procedure:	Correctly cleaned area and equipment and followed all safety rules.	4	3	2	1

EVALUATOR'S COMMENTS

AVERAGE RATING

Evaluator note: To obtain an average rating for the competency profile, total the designated points in "Product Evaluation" and divide by the total number of criteria. Circle the rating on the "Performance Evaluation Key" below.

PERFORMANCE EVALUATION KEY

4 **Skilled** - Can perform job with no additional training

3 **Moderately Skilled** - Has performed job during training program; limited additional training may be required

2 **Limited Skill** - Has performed job during training program; additional training is required to develop skill

1 **Unskilled** - Is familiar with process, but is unable to perform job

JOB SHEET 5

Break lamb into wholesale cuts.

Student's name ______________________ Date ____________

Evaluator's name ______________________ Attempt no. ______

Instructions: When you are ready to perform this task ask your instructor to observe the procedure and complete this form. All items listed under "Process Evaluation" must receive a "Yes" for you to receive an overall performance evaluation.

PROCESS EVALUATION

Evaluator note: Write a check mark in the "Yes" or "No" blanks to designate whether or not the student has satisfactorily achieved each step in this procedure. If the student is unable to achieve this competency, have the student review the materials and try again.

The student:	Yes	No
1. Correctly followed safety procedures.	____	____
2. Correctly broke carcass.	____	____
3. Separated leg from loin correctly.	____	____
4. Separated legs.	____	____
5. Sawed between rib and the shoulder at the correct angle.	____	____
6. Removed flank and breast at correct point.	____	____
7. Correctly trimmed all cuts.	____	____
8. Put away tools and cleaned work area.	____	____

EVALUATOR'S COMMENTS

____

____

____

PRODUCT EVALUATION

Evaluator note: Rate the student on the following criteria by circling the appropriate numbers. Each criterion must receive a rating of "3" or higher to demonstrate student mastery. (See Performance Evaluation Key.) A student who is unable to demonstrate mastery should review the material and submit another product for evaluation.

Criteria:

Separated Legs:	Identified cut lines correctly, made smooth cuts, cut at correct angles.	4	3	2	1
Cut Loin:	Identified cut lines with no errors, made smooth cuts, cut at correct angles.	4	3	2	1
General procedure:	Correctly cleaned area and equipment and followed all safety rules.	4	3	2	1

EVALUATOR'S COMMENTS

AVERAGE RATING

Evaluator note: To obtain an average rating for the competency profile, total the designated points in "Product Evaluation" and divide by the total number of criteria. Circle the rating on the "Performance Evaluation Key" below.

PERFORMANCE EVALUATION KEY

4 **Skilled** - Can perform job with no additional training
3 **Moderately Skilled** - Has performed job during training program; limited additional training may be required
2 **Limited Skill** - Has performed job during training program; additional training is required to develop skill
1 **Unskilled** - Is familiar with process, but is unable to perform job

PRACTICAL TEST 6 — FABRICATING CARCASSES AND BOX MEAT — VII

JOB SHEET 6 — **Fabricate retail cuts of lamb.**

Student's name ____________________ Date ____________

Evaluator's name ____________________ Attempt no. ______

Instructions: When you are ready to perform this task ask your instructor to observe the procedure and complete this form. All items listed under "Process Evaluation" must receive a "Yes" for you to receive an overall performance evaluation.

PROCESS EVALUATION

Evaluator note: Write a check mark in the "Yes" or "No" blanks to designate whether or not the student has satisfactorily achieved each step in this procedure. If the student is unable to achieve this competency, have the student review the materials and try again.

The student:	Yes	No
1. Correctly followed safety procedures.	____	____
2. Correctly broke subprimals.	____	____
3. Adequately fabricated retail cuts.	____	____
4. Fabricated a Frenched leg.	____	____
5. Fabricated an American leg.	____	____
6. Fabricated flank and breast correctly.	____	____
7. Left fell as much as possible.	____	____
8. Fabricated crown roast.	____	____
9. Packaged meat and returned it to the cooler.	____	____
10. Put away tools and cleaned work area.	____	____

EVALUATOR'S COMMENTS

____

____

____

PRODUCT EVALUATION

Evaluator note: Rate the student on the following criteria by circling the appropriate numbers. Each criterion must receive a rating of "3" or higher to demonstrate student mastery. (See Performance Evaluation Key.) A student who is unable to demonstrate mastery should review the material and submit another product for evaluation.

Criteria:

Fabricate Legs:	Identified cut lines Identified cut lines correctly, made smooth cuts, cut at correct angles.	4	3	2	1
Fabricate Chops:	Identified cut lines with no errors, made smooth cuts, cut at correct angle.	4	3	2	1
General procedure:	Correctly cleaned area and equipment and followed all safety rules.	4	3	2	1

EVALUATOR'S COMMENTS ______________________________

____

____

AVERAGE RATING

Evaluator note: To obtain an average rating for the competency profile, total the designated points in "Product Evaluation" and divide by the total number of criteria. Circle the rating on the "Performance Evaluation Key" below.

PERFORMANCE EVALUATION KEY

4 **Skilled** - Can perform job with no additional training
3 **Moderately Skilled** - Has performed job during training program; limited additional training may be required
2 **Limited Skill** - Has performed job during training program; additional training is required to develop skill
1 **Unskilled** - Is familiar with process, but is unable to perform job

PRACTICAL TEST 7

FABRICATING CARCASSES AND BOX MEAT

VII

JOB SHEET 7

Demonstrate the scraping of meat cuts.

Student's name ____________________ Date ____________

Evaluator's name ____________________ Attempt no. ______

Instructions: When you are ready to perform this task ask your instructor to observe the procedure and complete this form. All items listed under "Process Evaluation" must receive a "Yes" for you to receive an overall performance evaluation.

PROCESS EVALUATION

Evaluator note: Write a check mark in the "Yes" or "No" blanks to designate whether or not the student has satisfactorily achieved each step in this procedure. If the student is unable to achieve this competency, have the student review the materials and try again.

The student:	Yes	No
1. Correctly followed safety procedures.	____	____
2. Correctly removed meat and bone dust.	____	____
3. Used minimum pressure to prevent damage to meat.	____	____
4. Put away tools and cleaned work area.	____	____

EVALUATOR'S COMMENTS

____

____

____

PRODUCT EVALUATION

Evaluator note: Rate the student on the following criteria by circling the appropriate numbers. Each criterion must receive a rating of "3" or higher to demonstrate student mastery. (See Performance Evaluation Key.) A student who is unable to demonstrate mastery should review the material and submit another product for evaluation.

Criteria:

Scraping meat:	Scraped completely, scraped both sides, used minimum pressure to prevent damage to the cut face.	4	3	2	1
General procedure:	Correctly cleaned area and equipment and followed all safety rules.	4	3	2	1

EVALUATOR'S COMMENTS ______________________________

____

____

AVERAGE RATING

Evaluator note: To obtain an average rating for the competency profile, total the designated points in "Product Evaluation" and divide by the total number of criteria. Circle the rating on the "Performance Evaluation Key" below.

PERFORMANCE EVALUATION KEY

4 **Skilled** - Can perform job with no additional training
3 **Moderately Skilled** - Has performed job during training program; limited additional training may be required
2 **Limited Skill** - Has performed job during training program; additional training is required to develop skill
1 **Unskilled** - Is familiar with process, but is unable to perform job

JOB SHEET 8

Tenderize meat.

Student's name ______________________ Date __________

Evaluator's name ______________________ Attempt no. ______

Instructions: When you are ready to perform this task ask your instructor to observe the procedure and complete this form. All items listed under "Process Evaluation" must receive a "Yes" for you to receive an overall performance evaluation.

PROCESS EVALUATION

Evaluator note: Write a check mark in the "Yes" or "No" blanks to designate whether or not the student has satisfactorily achieved each step in this procedure. If the student is unable to achieve this competency, have the student review the materials and try again.

The student:	Yes	No
1. Correctly followed safety procedures.	____	____
2. Correctly fed meat.	____	____
3. Allowed machine to feed itself.	____	____
4. Turned piece 90 degrees for second run.	____	____
5. Put away tools and cleaned work area.	____	____

EVALUATOR'S COMMENTS

____

____

____

PRODUCT EVALUATION

Evaluator note: Rate the student on the following criteria by circling the appropriate numbers. Each criterion must receive a rating of "3" or higher to demonstrate student mastery. (See Performance Evaluation Key.) A student who is unable to demonstrate mastery should review the material and submit another product for evaluation.

Criteria:

Feeding machine:	Kept hands away from opening, allowed machine to pull in meat, turned meat a full 90 degrees.	4	3	2	1
General procedure:	Correctly cleaned area and equipment and followed all safety rules.	4	3	2	1

EVALUATOR'S COMMENTS

AVERAGE RATING

Evaluator note: To obtain an average rating for the competency profile, total the designated points in "Product Evaluation" and divide by the total number of criteria. Circle the rating on the "Performance Evaluation Key" below.

PERFORMANCE EVALUATION KEY

4 **Skilled** - Can perform job with no additional training
3 **Moderately Skilled** - Has performed job during training program; limited additional training may be required
2 **Limited Skill** - Has performed job during training program; additional training is required to develop skill
1 **Unskilled** - Is familiar with process, but is unable to perform job

WRITTEN TEST

FABRICATING CARCASSES AND BOX MEAT

VII

Name ______________________________ Score __________

OBJECTIVE 1

Match terms associated with fabricating carcasses to their correct definitions. Write the correct letter in the blank.

Part I

____ 1. Usually a more tender cut of 1 inch or less thickness; acceptable for broiling or brazing

____ 2. Industry term for the diaphragm muscle

____ 3. The process of cutting primal subdivisions into retail cuts

____ 4. Lymph node in the leg which contains bacteria

____ 5. Institutional Meat Purchase Specifications; general specifications for meat fabrication for institutional use

____ 6. Processor that bones out the complete carcass of older and low quality animals to be ground, processed, or canned

____ 7., Hotel, restaurant, and institution trade; group of meat retailers that require a narrow range of specifications as to grade, weight, size, and uniformity

a. Deckle

b. Half carcass

c. Fabrication

d. Canner

e. Steak

f. Boner

g. IMPS

h. Hanging tender

i. Flank cut

j. Popliteal lymph node

k. Inner muscle

l. Roast

m. Primal

n. Tender cut

o. HRI

May be photocopied for student use.

_____ 8. Wholesale cut or major subdivisions of a carcass

_____ 9. A less tender cut of meat 2 inches or more in thickness; best cooked with moist heat

_____ 10. Layer of muscle and fat on the top surface of a brisket.

Part II

_____ 1. That part of the muscle in a beef round anterior to the thigh bone

_____ 2. Meat middle man that buys whole carcasses or primal cuts and then resells to consumers or retail outlets with or without further processing

_____ 3. Cured and smoked beef

_____ 4. Muscle system of the back which supports the animal; makes up the rib eye

_____ 5. Half of a side of beef fabricated by splitting the half between the 12th and 13th ribs

_____ 6. Thin membrane separating the pelt from the subcutaneous fat of a lamb

_____ 7. Small, thin tender cut that can be separated by a cleaver

a. Fell
b. Tip roast
c. Sirloin tip
d. Chop
e. Hock
f. Purveyor
g. Wholesale cut
h. Corned beef
i. Longissimus dorsi
j. Primal
k. Quarter
l. Subprimal
m. Retail cut

May be photocopied for student use.

_____ 8. Process of subdividing primal cuts into different parts which have differences in value and composition

_____ 9. Subdivisions of primal cuts which are sold to the consumer in a ready-to-cook or ready-to-eat form

OBJECTIVE 2

Select from a list the information ICMISC recommends to be included on a meat label. Write an "X" by the correct answers.

_____ 1. Cut weight

_____ 2. Primal cut

_____ 3. Percentage of lean

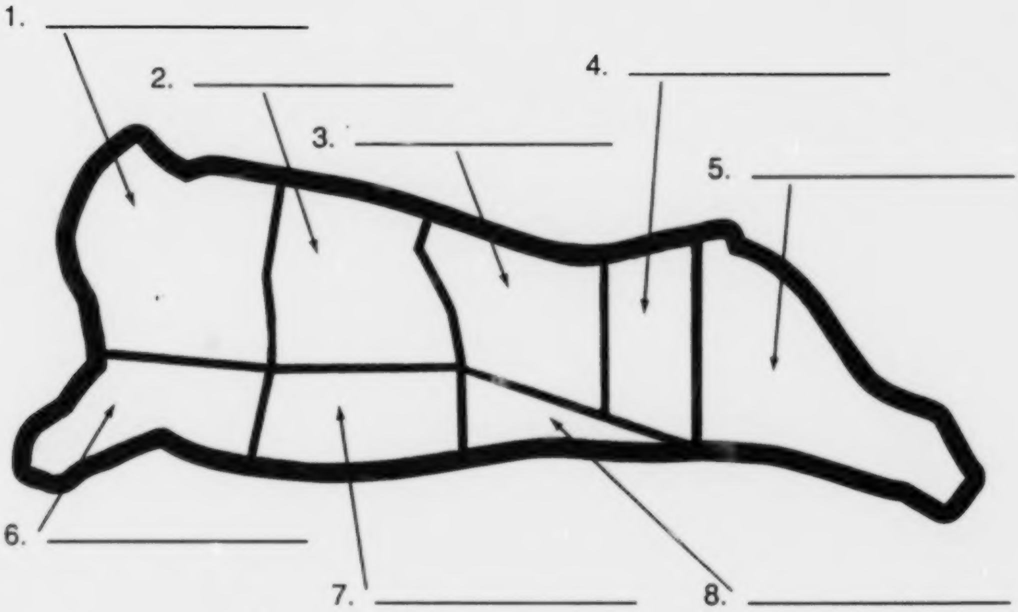
_____ 4. Retail cut name

_____ 5. Carcass age

_____ 6. Species

May be photocopied for student use.

OBJECTIVE 3 **Label primal cuts of a carcass.** Write the correct names in the blanks.



OBJECTIVE 4 **Select from a list true statements about boxed meat.** Write an "X" in the blank before each true statement.

____ 1. With shrink-wrapped meat, color and flavor can be maintained almost twice as long.

____ 2. With shrink-wrapped boxed meat, shelf life and freshness are greatly improved.

____ 3. With shrink-wrapped boxed meat, prices are consistently held at their lowest levels.

____ 4. With shrink-wrapped boxed meat, inventory controls for retailers, wholesalers, and packers have been streamlined.

____ 5. With shrink-wrapped boxed meat, quality control and uniformity are assured.

____ 6. Boxed meat came into use in the late 1950's.

____ 7. Boxed meat came into use in the mid-1970's.

____ 8. Boxed meat came into use in the early 1980's.

May be photocopied for student use.

OBJECTIVE 5

Choose the word or phrase to complete statements about fat trimming methods. Write the correct letter in the blank.

_____ 1. Most retail cuts are sold with a fat trim of

a. ⅛ inch or less
b. ¼ inch or less
c. ⅜ inch or less
d. ½ inch or less

_____ 2. Fat is trimmed from a carcass immediately after slaughter by

a. cutting with a hot knife
b. cutting with an electric knife
c. shaving with a type of razor
d. scraping with a U-shaped blade

_____ 3. The difficulty in trimming a carcass immediately after slaughter is

a. the fat adheres to the meat too firmly
b. lack of firmness in the fat
c. the surface is too slick for good control
d. the flavor is compromised

_____ 4. On meat cuts, today's consumers

a. enjoy the flavor of fat
b. prefer less fat
c. show a marked aversion to fat
d. refuse to buy meat with any fat

OBJECTIVE 6

Choose the word or phrase to complete statements about portion control. Write the correct letter in the blank.

_____ 1. Consumer buying patterns have changed in the last twenty years for all the following reasons EXCEPT

a. working women
b. family activities
c. faster life-styles
d. smaller families

May be photocopied for student use.

____ 2. Changes to adapt to consumer buying patterns include smaller portions, packaging for quick cooking, and

a. more complete boning
b. greater use of flavor enhancers
c. reduced amount of color additives
d. more attractive packaging

____ 3. Portion control has led to

a. increased price controls
b. expanded markets here and abroad
c. exact requirements for meat products
d. genetic adaptations in breeding stock

OBJECTIVE 7 **Select from a list factors considered in developing meat specifications.** Place an "X" before each factor which should be specified in the wholesale purchase of meat.

____ 1. Pack

____ 2. Temperature

____ 3. Price

____ 4. Yield

____ 5. Shrink

____ 6. Grade

____ 7. Cut

____ 8. Breed

____ 9. Portion Control

____ 10. Age

____ 11. Appearance

____ 12. Trim

May be photocopied for student use.

OBJECTIVE 8 **Select from a list properties of quality packaging materials.** Write an "X" in the blank before each property.

____ 1. Airtight

____ 2. Biodegradable

____ 3. Differing oxygen permeability

____ 4. Animal or petroleum based

____ 5. Easy to mark for identification

____ 6. Grease-proof and stain-proof

____ 7. Good stripping qualities

____ 8. Good tensile strength; puncture resistant

____ 9. Low in cost

____ 10. Low moisture-vapor transmission

____ 11. Maintain pliability and strength in sub-zero temperatures.

____ 12. Non-toxic

____ 13. Odorless

____ 14. Pliable

____ 15. Remain transparent in sub-zero temperatures

____ 16. Good sealing properties

____ 17. Conform to the shape of the product enclosed

May be photocopied for student use.

OBJECTIVE 9 **Match meat packaging materials with their descriptions.** Write the correct letter in the blank.

____ 1. Wrapping material made of vegetable parchment; most often used by local meat processors for freezing meat.

____ 2. Used for heat-sterilized meat products such as beef sticks, jerky, etc.; highly resistant to punctures

____ 3. When dry, this material has a low oxygen transmission rate; when it comes in contact with a cut meat surface, the water in the meat causes a significant increase in oxygen transmission, keeping the meat a bright red color

____ 4. Food-grade product for dipping sausages and other products; made from distilled animal fats

____ 5. Has multiple layers of different polymers that meet specific needs of different meat products; resists abrasion, provides an excellent oxygen barrier, and can be heat-shrunk to form a tight seal around meat.

____ 6. Material primarily used for home freezing; easily torn, prone to puncture, and can't be used in microwave ovens

a. Aluminum foil

b. Cellophane

c. Copolymer film

d. Dermatex

e. Kraft paper

f. Laminated foil

g. Polyethylene film

h. Polyurethane film

i. Waxed paper

May be photocopied for student use.

OBJECTIVE 10

State the recommended percentage of fat and lean for ground meat.

What is the recommended percentage of fat to lean for ground beef:

____

OBJECTIVE 11

Choose the word or phrase to complete statements about the different ways to tenderize meat. Write the correct letter in the blank.

____ 1. Aged beef may be treated with a solution containing

- a. acids
- b. oxygen
- c. fungi or bacteria
- d. enzymes or preservatives

____ 2. The enzyme papain

- a. comes from the pineapple
- b. is the most commonly used enzyme
- c. attacks connective tissue
- d. comes from the fig

____ 3. The enzyme ficin

- a. comes from the pineapple
- b. comes from the papaya
- c. attacks connective tissue but does little to meat fibers
- d. breaks down connective tissue and also breaks down proteins in muscle fibers

____ 4. Bromelin is the enzyme that

- a. comes from the fig
- b. comes from the papaya
- c. attacks connective tissue but does little to meat fibers
- d. breaks down connective tissue and also breaks down proteins in muscle fibers

May be photocopied for student use.

_____ 5. Cubing is a type of

a. chemical tenderization
b. electrical stimulation
c. hand tenderization
d. mechanical tenderization

_____ 6. The tenderizing process which provides a faster, more complete blood loss at a slaughter and a faster chilling time is

a. chemical tenderization
b. electrical tenderization
c. hand tenderization
d. mechanical tenderization

_____ 7. Electrical stimulation improves tenderness and flavor by

a. decreasing acid levels
b. delaying rigor mortis
c. reducing muscle contractions and relaxations
d. shortening muscle fiber

_____ 8. Mechanical tenderization is used to

a. shorten or break up connective tissues and tough muscle fibers.
b. increase the amount of air in the muscle fiber
c. increase the acid levels
d. stimulate enzymes to break down meat fibers and connective tissues

_____ 9. A type of meat which is typically tenderized by scoring is

a. lamb
b. flank steak
c. corned beef
d. pork steak

NOTE: Objectives 12 through 23 are evaluated on job sheets/assignment sheets in this unit. If you have not completed these components, see your instructor.

May be photocopied for student use.

WRITTEN TEST ANSWERS

FABRICATING CARCASSES AND BOX MEAT

VII

OBJECTIVE 1

Part I	Part II
1. e	1. c
2. h	2. f
3. c	3. h
4. j	4. i
5. g	5. k
6. f	6. a
7. o	7. d
8. m	8. l
9. l	9. m
10. a	

OBJECTIVE 2

2, 3, 4, 6

OBJECTIVE 3

A. Chuck

B. Rib

C. Short loin

D. Sirloin

E. Round

F. Tip

G. Flank

H. Plate

I. Brisket

J. Shank

OBJECTIVE 4	2, 4, 5, 7			
OBJECTIVE 5	1.	b		
	2.	d		
	3.	b		
	4.	c		
OBJECTIVE 6	1.	b		
	2.	a		
	3.	c		
OBJECTIVE 7	1, 4, 5, 6, 7, 9, 10, 12			
OBJECTIVE 8	3, 5, 6, 7, 8, 10, 11, 12, 13, 14, 16			
OBJECTIVE 9	1.	e	6.	a
	2.	f		
	3.	b		
	4.	d		
	5.	c		
OBJECTIVE 10	15-30 percent fat			
OBJECTIVE 11	1.	c	6.	b
	2.	b	7.	a
	3.	d	8.	a
	4.	c	9.	b
	5.	d		

OBJECTIVE SHEET

POULTRY PROCESSING

VIII

INTRODUCTION

Poultry is one of the most inexpensive meats available to the consumer today. The chicken has the ability to convert feed to meat more efficiently than other animals. Because of this and its size, which lends itself to mechanized production and processing, the consumption of poultry has increased dramatically. The processing of poultry is by far the most automated meat processing industry in the world.

UNIT OBJECTIVE

After completing this unit, the student will know processing procedures and be able to properly process different types of poultry. The student will demonstrate these competencies by completing the job sheets and written test with a minimum of 85 percent accuracy.

SPECIFIC OBJECTIVES

After completing this unit, the student will be able to

1. Match terms associated with processing poultry to their correct definitions.
2. Match the classes of chickens and turkeys to their descriptions.
3. Select from a list factors affecting the quality grading of dressed and ready-to-cook poultry.
4. Discuss the selection and handling of birds prior to dressing.
5. List methods of bleeding a poultry carcass.
6. Discuss dry-picking and debraining of poultry.
7. Choose the word or phrase to complete statements about scalding practices used to defeather poultry.
8. Arrange in order the steps to eviscerate and truss a chicken.
9. Select from a list the various retail cuts of poultry.
10. Select from a list handling and slaughtering factors which affect dressing percent.
11. Slaughter and process a chicken (Job Sheet 1).
12. Cut up a chicken (Job Sheet 2).

PREPARATION

- Obtain materials to supplement unit.

  NOTE: See Suggested Resources.

- Review instructional outline for this unit. Modify time frames to suit class needs and plan activities for each class period.
- Study specific objectives to determine those you will cover in your presentation. Decide which objectives should be taught to which students.
- Determine scope and sequence of objectives that you add. Design and develop support materials, including evaluation techniques, for additional objectives.
- Determine how you will schedule time for students to demonstrate competence in the required procedures.
- Make arrangements for guest speakers. Supply speakers with specific objectives and other appropriate sections of the unit.
- Arrange for students to tour a poultry processing plant. The addresses of two Oklahoma poultry processing plants are listed in Supplement 2.
- Arrange to have live slaughter-weight chickens and equipment necessary to complete Job Sheet 1.
- Arrange to have whole chicken carcasses and equipment necessary to complete Job Sheet 2.
- Prepare classroom.
  - — Put up posters, charts, and other items dealing with poultry processing.
  - — Have articles, brochures, and other literature dealing with poultry processing available for students.

DELIVERY

Objectives 1 through 3

- Collect carcasses of different types of poultry to explain differences in carcasses.

- Examine live birds of various quality grades to demonstrate discernable differences.
- Collect carcasses which exhibit different quality defects to illustrate these defects.

Objective 4

- Have a poultry grower talk to the class about the importance of correct handling practices.

Objectives 5 through 8

- Demonstrate different slaughter and processing methods on live birds to illustrate problems and advantages of each method.
- Take a field trip to a poultry processing plant to examine commercial methods of processing.

  NOTE: See Supplement 2 for names and addresses of plants.

Objective 9

- Collect bones from different types of poultry to show differences in skeletal structure.
- Collect bones from the retail cuts to illustrate various methods of fabrication and their effect on the bone structure.
- Take a field trip to a local supermarket to view the different methods of fabricating retail cuts.

Objective 10

- Slaughter poultry which has been handled in different ways prior to slaughter to demonstrate the effect on dressing percent.

APPLICATION

Objective 11

- Use Job Sheet 1 to provide students with the opportunity to develop skills in processing chickens.
- Use Job Sheet 2 to provide students with the opportunity to develop skills in cutting up a chicken.

EVALUATION

Practical Test

- Explain to students that they will be asked to demonstrate procedures on the job sheets to complete the practical test.
- Describe the rating scale used on the practical test.
- Give practical test.
- Reteach and retest if necessary.

Written Test

- Explain to students that they will be asked to demonstrate on the written test actions listed in the specific objectives.
- Give written test.

  NOTE: The written test may be given in sections if desired.
- Reteach and retest if necessary.
- Complete appropriate sections of competency profiles.
- Review individual and group performance in order to evaluate teaching methods. Adjust scope, sequence, or instructional approaches for additional lessons required.

SUGGESTED RESOURCES

- Mountney, George J., *Poultry Products Technology*, Food Product Press, 1989.
- Romans, John R., Kevin W. Jones, William J. Costello, C. Wendell Carlson, and P. Thomas Ziegler, *The Meat We Eat*, The Interstate Printers and Publishers, Danville, Illinois, 1985.

UNIT REFERENCES

- Romans, John R., Kevin W. Jones, William J. Costello, C. Wendell Carlson, and P. Thomas Ziegler, *The Meat We Eat*, The Interstate Printers and Publishers, Danville, Illinois, 1985.

OBJECTIVE 1

Match terms associated with processing poultry to their correct definitions.

- **Bleeding** — A method used to drain all of the blood from an animal
- **Debraining** — The process by which the brains of an animal are removed
- **Defeathering** — Removal of the feathers from poultry
- **Diminutive feathers** — Fine, nearly unnoticeable feathers that look much like fuzz
- **Dry-picking** — A process that includes removing the feathers from poultry by plucking rather than scalding
- **Eviscerate** — The removal of all non-edible parts of poultry such as the head, the crop, the windpipe, and the feet
- **Groove** — The roof of the mouth of a bird
- **Pinfeather** — An undeveloped feather that is just emerging through the skin which can be difficult to remove and lowers the value of the carcass
- **Scalding** — Boiling water is used to defeather birds having a large number of pinfeathers; is not used in the commercial market
- **Vestigial feathers** — Feathers appearing at the entrance to the cavity of the bird
- **Wax picking** — A method used to defeather a bird that has been "roughed" on the picking machine and dried by passing through the drying machine; next, the bird is dipped in melted wax and cooled; then the feathers are pulled from the body

OBJECTIVE 2

Match the classes of chickens and turkeys to their descriptions.

Chickens and turkeys are, by far, the most predominant type of poultry processed in the United States. Ducks, geese, guineas, and pigeons are also slaughtered here on a very small scale. Therefore, this objective will concentrate only on the two predominant types of poultry. Each type is subdivided into classes according to physical characteristics associated with age and sex.

Chickens

- **Rock Cornish Game or Cornish Game Hen** — A young, immature chicken that is usually five to six weeks of age and does not weigh more than two pounds at its ready-to-cook weight.
- **Rock Cornish Fryer, Roaster, or Hen** — A cross between a Plymouth Rock chicken and a Cornish. The age and characteristics of the bird determine the kind.
- **Broiler or Fryer** — A young male or female chicken that is usually under 13 weeks of age with tender meat, pliable skin, and flexible breastbone cartilage.
- **Roaster** — A young female or male chicken that is usually three to five months of age with tender meat, pliable skin, and a somewhat flexible breastbone.
- **Capon** — A surgically castrated male chicken that is usually under eight months of age with tender meat and soft skin.
- **Hen Fowl or Baking Chicken** — A mature female chicken that is over ten months of age with meat less tender than that of a roaster and has a non-flexible breastbone.
- **Cock or Rooster** — A mature male chicken that has coarse skin, toughened and darkened meat, and a hardened breastbone tip.

Turkeys

- **Fryer-Roaster Turkey** — A young, immature male or female turkey that is usually under 16 weeks old with tender meat, pliable skin, and a flexible breastbone.
- **Young Turkey** — A young male or female turkey that is under eight months of age with tender meat, pliable skin, and a breastbone cartilage that is somewhat less flexible than a fryer-roaster.
- **Yearling Turkey** — Mature male or female turkey that is under 15 months of age with somewhat tender meat and reasonably smooth skin.
- **Mature Turkey or Old Turkey** (Hen or Tom) — A male or female turkey over 15 months of age with coarse skin and toughened flesh.

OBJECTIVE 3

Select from a list factors affecting the quality grading of dressed and ready-to-cook poultry.

The grading of poultry involves the sorting of products according to size, quality, quantity, condition of the product, and the determination of the class. Only ready-to-cook poultry that has been inspected and graded on an individual bird basis may be marked with an official grade mark. Several factors which influence quality grade are:

- Conformation
- Fleshing
- Fat covering
- Defeathering
- Exposed flesh
- Disjointed and broken bones and missing parts
- Discolorations of the skin and flesh
- Freezing defects

OBJECTIVE 4

Discuss the selection and handling of birds prior to dressing.

The main factor to consider when selecting poultry for slaughter is appearance. The top priority is a well-finished, thick-meated, and full-breasted bird that will be a top grade bird if it is properly dressed. Well-rounded birds are selected to avoid having too many birds of lower grades. For instance, turkeys are checked for the color of their flesh since a blue appearance means the turkey needs to be fed for a longer period of time.

Not only is the selection of a bird important, but also the handling of the bird. It is necessary to avoid bruises, abrasions, or broken limbs since this detracts from the quality grade. Several significant factors such as temperature, access to water, and proper ventilation are crucial for poultry to reach their ideal level of quality. Prior to dressing, feed should be withheld from 8 to 10 hours because it inhibits disemboweling and bleeding. There will be a marked loss in dressing yield if feed is withheld for more than 12 hours. Over-heated and over-excited birds will bleed poorly and have a lower keeping quality.

OBJECTIVE 5 List methods of bleeding a poultry carcass.

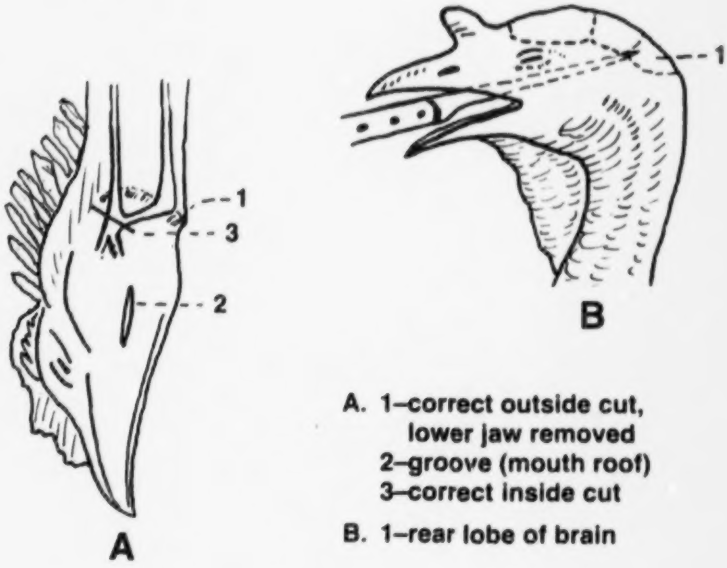
As with other animals, proper bleeding techniques result in higher quality carcasses and, in the case of poultry, ease of feather removal. Several methods are used:

- Severing the neck
- Cutting the throat

  NOTE: This is the most widely used method in the industry today.

- Cutting the veins

  NOTE: This method involves inserting a knife into the open mouth of the bird and severing the veins through the groove, or roof of the mouth.



A. 1–correct outside cut,
lower jaw removed
2–groove (mouth roof)
3–correct inside cut

B. 1–rear lobe of brain

CORRECT BLEEDING METHOD

Romans, Jones, Costello, Carlson, and Ziegler, *The Meat We Eat*, Interstate Publishers, Inc., 1985. Used with permission.

OBJECTIVE 6

Discuss dry-picking and debraining of poultry.

A fowl is defeathered and debrained immediately after bleeding. If the bird is to be dry-picked, the knife blade edge is held up and inserted into the cleft roof of the mouth and forced to the rear lobe of the brain. Puncturing the brain relaxes the feather muscles, causing the feathers to become loose. The bird must be plucked within 2-3 minutes of debraining because rigor mortis will cause the muscles to tighten and make plucking more difficult.

Roughing of the bird is usually done before the muscles reset. The main objective of this process is to pluck and handle the bird in a manner that causes the least tears, abrasions, or bruise spots. The final result should be a bird that maintains its natural bloom. In this process, a major part of the plumage of the bird is removed in the order in which the parts of the bird bleed out. The tail and wings are twisted and the breast, neck, thighs, back, and legs are plucked. Pinning is the last step used in the roughing process.

OBJECTIVE 7

Choose the word or phrase to complete statements about scalding practices used to defeather poultry.

Hard scalding (hot scalding) and semi-scalding (slack scalding) are two other ways to defeather fowl.

- **Hard or hot scalding** — This is the old-fashioned way to defeather fowl. This method is not used on birds destined for the commercial market. It is an early method that is still common in some areas. Water is heated to an extremely hot temperature and the bird is dipped into the water. The hotter the water is, the quicker the feathers will loosen. The temperature of the water should be gauged to prevent ruining the carcass. Young birds require a temperature of less than 150° F and mature birds scald well in 155-160° F water. This method works well on birds having a large number of pinfeathers. Caution should be taken when using the hot scald method, since overscalding could occur and cause the bird to have a cooked appearance.

- **Semi-scalding or slack scalding** — This method is used in all large poultry packing plants since it has the advantage of lower labor costs and lends itself well to mechanization. Processors have found that this method improves the appearance of the bird and does not cause discoloration of the carcass. By using this method, more birds are in the higher grade and the financial return to the processors is greater. The skin strength of the bird is not weakened and this method of scalding makes it possible to use a mechanical picker.

Wax picking is usually used in combination with this method when defeathering geese or ducks. After the birds are roughed on the picking machine, they are dried and dipped in melted wax for 30-60 seconds at 125-130° F. The wax is allowed to harden by passing the bird under a cold water spray. Sometimes it is necessary to wax dip the bird a second time and respray it. Finally, the hardened wax and feathers are pulled from the bird.

OBJECTIVE 8 **Arrange in order the steps to eviscerate and truss a chicken.**

Although there are a number of methods of eviscerating, the method listed below is generally accepted.

1. Remove the head of the bird.
2. Using a knife or bone shears, cut through the skin on the back of the neck and peel it down.
3. Sever the neck close to the shoulders.
4. Remove the windpipe and crop by hooking the short gullet and peeling the crop loose from the skin.
5. Loosen the lungs from the chest wall with the index finger by inserting it between the ribs and the lungs.
6. Remove the feet at the hock joint with the knife.
7. Make an incision from the rear end of the keel bone to the rectum, cutting around the rectum.
8. Remove the entrails from the cavity of the bird using your hands.
9. Remove the bile sac from the liver, separating it from the intestines.
10. Cut the gizzard away from the intestines by carefully separating it from the muscle and storing it in partially chilled water for easier peeling.
11. Shape the bird to give it a plump appearance.
12. Truss the bird by compressing the wings against the side of a carcass and bringing the legs together at the vent.
13. Tie it off with either a wire truss or a length of cord.

Romans, Jones, Costello, Carlson and Ziegler, *The Meat We Eat*, Interstate Publishers, Inc., 1985. Used by permission.

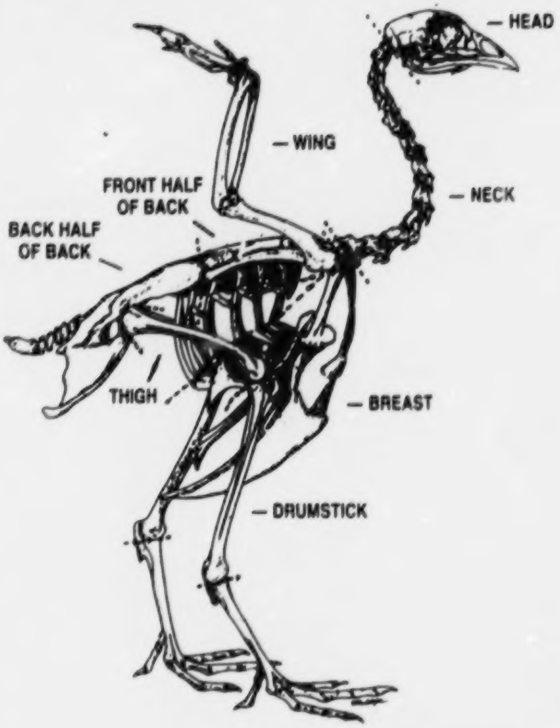
OBJECTIVE 9 **Select from a list the various retail cuts of poultry.**

The skeletal structures of the turkey and chicken are very similar. In both species, some cuts are determined by the skeletal structure of the bird.

Chickens and turkeys can be sold on the retail market either whole or cut up into their various parts. These cuts can vary in their fabrication due to the method of disassembly and the cut requirements of the retailer. Large poultry processing operations use automated disassembly machines. Usual poultry cuts include:

- Breasts and wishbones
- Legs or Drumsticks
- Thighs
- Wings
- Backs
- Necks
- Gizzards
- Livers

Most automated disassembly operations produce either an eight or nine piece carcass. In the eight piece operation, two breasts, two wings, two legs, and two thighs with the back attached are produced. In the nine piece operation, three breast pieces, two wings, two legs, and two thighs are produced.



Romans, Jones, Costello, Carlson, and Ziegler, *The Meat We Eat*, Interstate Publishers, Inc., 1985. Used with permission.

OBJECTIVE 10 **Select from a list handling and slaughtering factors which affect dressing percentage.**

Several days prior to slaughter, birds are sampled and tested for drug residues and to determine optimum time for slaughter.

There are several handling and slaughter factors that affect dressing percent.

- **Withholding feed** — When feed is withheld from birds for as long as 12 hours before slaughter, an unacceptable reduction in yield can be expected. Ideally, birds should only be removed from feed for 8 - 10 hours before slaughter. This results in an expected shrink of two percent in chickens and seven percent in turkeys.
- **Bleeding and removing feathers** — Chickens will lose about 11 percent of their body weight when they are bled and defeathered. Blood and feathers make up about 10 percent of a turkey's body weight.
- **Dressing** — Fully dressed chickens will lose about 25-27 percent and fully dressed turkeys will lose about 20 percent of their body weight.
- **Loading** — Live birds are usually loaded for transport at night to reduce stress from the heat and to make them easier to handle.

MACHINES USED IN POULTRY PROCESSING

The poultry processing industry is the most highly mechanized segment of the meat industry today. Machines do most of the steps in the processing of birds. This supplement sheet will introduce some of the machines used to process poultry.

Various manufacturers produce different types of machines to process poultry. Many commercial poultry processing plants use an overhead track mechanism which is much like a belt chain with oval links. The oval link chains hold the shackles for suspending the birds and move at a controlled speed. Poultry processors are able to process approximately 3,000 birds per hour with a single system of machines.

One type of machine is the USDA-approved Gainesville Automatic Poultry Cut-up System which consists of two machines. One machine cuts up the front half of the bird and the other cuts up the back half of the bird.

Other machines that might be used include the following:

- Automatic stunner
- Automatic killer
- Scalder
- Picker
- Hock picker
- Automatic hock cutter
- Outside bird washer
- Disemboweling trough
- Oil sac cutter
- Opening cut machine
- Automatic drawing machine
- Automatic cut-up machines
- Automatic gizzard processing system
- Automatic lung remover
- Automatic neck breaker
- Combination washer
- Automatic head cutter
- Automatic neck skin cutter
- Automatic continuous chill system
- Continuous giblet chiller
- Automatic giblet wrapper
- Automatic sizing system

ADDRESSES OF POULTRY PROCESSING PLANTS

Simmons Industries
P. O. Box 430
Siloam Springs, AR 72761
(501) 524-8151
Plant is located in Jay, Oklahoma

Tyson Foods
P. O. Box 38
Grannis, AR 71944
(501) 385-2331
Plant is located in Broken Bow, Oklahoma

JOB SHEETS 1 AND 2

Development of:
READING SKILLS
SCIENCE SKILLS
EMPLOYABILITY SKILLS

- Introduce the assignment to the students by discussing why reading, science, and employability skills are important.
- Discuss with them the following skills which are relevant to this task:

  READING SKILLS

  - Following written instructions

  SCIENCE SKILLS

  - Using scientific instruments (thermometers)

  EMPLOYABILITY SKILLS

  - Mastering specific job task/procedure
  - Applying safety practices/procedures
  - Developing good work habits/attitudes

- If students have difficulty following written instructions:
  - Discuss the possible consequences of not following instructions precisely.
  - Have them read the instructions several times, noting the key words and ideas.
- If students have difficulty using the thermometer:
  - Show them the proper procedure.
  - Make sure they know the appropriate length of time the thermometer must remain in place to register the temperature.

- If students have difficulty mastering a specific job task/procedure:
  - Emphasize the fact that practice makes a person proficient, and proficiency makes a person confident.
  - Suggest they study each component of the procedure to determine which area is causing difficulty.
  - Review the entire procedure.
  - Allow the student to observe as classmates perform the task/procedure.
- If students have difficulty applying safety practices/procedures:
  - Discuss the reasons for and the importance of each safety practice.
  - Instruct them in the use of various techniques to help them remember safety practices.
  - Visualization — making a mental picture.

    EXAMPLE: Visualize how a person looks using a sharp boning knife, pointing the knife away from the body, with hands placed safely before making cuts.
  - Association — Connecting a new term with something you already know.

    EXAMPLE: Connect the meat saws to saws used in construction and follow the same safety precautions in cutting with them.
- If students have difficulty developing good work habits/attitudes:
  - Encourage them to become familiar with the entire procedure before they begin the work.
  - Discuss the role that good work habits and attitudes have in obtaining and retaining employment.
  - Discuss what behaviors and attitudes constitute good work habits.
  - Make sure the student knows what is expected of him or her.

JOB SHEET 1

POULTRY PROCESSING

VIII

OBJECTIVE 11 **Slaughter and process a chicken.**

INTRODUCTION

The processing of chickens and other poultry is highly automated and is done in large, high volume operations. It is important for the student to understand all of the steps necessary by doing them manually. In this job sheet, the student will manually slaughter and process a chicken.

EQUIPMENT AND SUPPLIES

- Live slaughter-weight chicken
- Sticking knife
- Hanging shackle
- Tub of scalding water
- Cold water vat
- Ice water vat
- Pinning knife
- Boning knives (3½ & 6 in.)
- Bone shears
- Thermometer

SAFETY

Before you can perform this procedure, your instructor must have approved your use of knives and saws. Be sure to follow all safety rules in using this equipment.

PROCEDURE

Functional Reading Skills
- Follow written instructions

1. Hang the bird by one foot from a shackle. Grasp the head with the thumb and forefinger on both sides of the big junction. Using a boning knife, cut the throat, as close to the head as possible, and as deep as the neck bone. If a free passage of blood is not obtained from the cut, repeat the process until there is free bleeding. Allow the chicken to hang until it has bled completely.

   NOTE: This is considered a humane slaughter method since loss of blood causes the bird to become unconscious.

General Science Skills

- Use scientific instruments (thermometer)

Job Acquisition/ Development Skills

- Master specific job task/procedure
- Apply safety practices/ procedures
- Develop good work habits/attitudes

2. While the chicken is bleeding, use the thermometer to check the water temperature in the scalding vat. The temperature should be 145° F. This is the ideal temperature for hand picking young chickens. When the temperature is correct, remove the bird from the shackle and dip it into the water repeatedly until the feathers loosen. After each dip, check the feathers looseness by attempting to pull some from the carcass. Be careful not to overscald the bird because it causesthe skin to tear and discolor, giving the carcass a cooked appearance. Immediately after the bird is successfully scalded, immerse it in cold water to preserve freshness.

3. After leaving the bird in cold water for several seconds to prevent over scalding, remove the bird and pluck the feathers. Take care during plucking and pull only a few feathers at a time to prevent tears in the skin. After removing all of the major feathers, remove the pin feathers and diminutive feathers.

4. Place the bird in a vat of ice water until the carcass temperature is lowered to 35°. This is important in improving the quality of the bird and makes processing easier.

5. After the carcass has chilled, eviscerate the bird. First, remove the head using the bone shears to cut through the neck below the head. Peel the skin down and sever the neck close to the shoulders. Remove the crop and windpipe by hooking a finger between the gullet and the crop and peel it loose from the skin. Cut it loose at the lower end of the gullet. Next, loosen the lungs from the chest wall by inserting a finger between the ribs and lungs through the neck opening.

6. Using the bone shears, remove the feet at the hock joint. Make an incision from the rear end of the keel bone to the rectum and then cut around the rectum using the sticking knife. Pull the keel upward and insert your hand in the body cavity and draw out the intestinal track, heart, lungs, and liver. Remove the bile sac by cutting it from the liver, then separate the intestines from the liver. Cut the gizzard away from the intestines and make a split along the fleshy side of the gizzard deep enough to cut the muscle but not the lining of the gizzard.

7. Remove the lining of the gizzard and its contents, without breaking it, by pressing with your thumbs and pulling the halves of the gizzard apart.

8. Wash the carcass thoroughly in cold water and place it in the refrigerator.

9. Clean work area and put away your tools.

JOB SHEET 2 — POULTRY PROCESSING — VIII

OBJECTIVE 12

Cut up a chicken.

INTRODUCTION

To accommodate consumer demand, more and more broilers are being sold as parts. Packages may contain all white meat, all dark meat, or all legs or wings for specialty recipes. Although the process is automated in most high-volume operations, it is still important that the student be familiar with the manual process.

EQUIPMENT AND SUPPLIES

- Whole chicken carcass
- Boning knives (3 ½ & 6 in)
- Meat saw

SAFETY

Before you can perform this procedure, your instructor must have approved your use of knives and saws. Be sure to follow all safety rules in using this equipment.

PROCEDURE

Chickens can be cut up many different ways to produce the various cuts desired by the retail customer. The method used in this job sheet is the standard method used for cutting up most fryers.

1. Disassembly of a chicken usually starts with the separation of the breast from the back. To accomplish this, cut through the junction of the vertebral and sternal ribs on either side along the mid-line. This cut can be made with a knife because of the small size of the ribs. Separate the breast into two or three parts as preferred. When two parts are required, make a cut on one side of the keel bone along the length of the breast down to the base of the breast bone and wishbone. Use a strong knife or saw to separate the two halves of the breast. If three breast pieces are required, make a cut at right angles to the long axis of the breast, just forward of the front tip of the keel. Continue the cut downward to the base of the breast bone and then turn forward to the junction of the wishbone. Sever the joints of the wishbone and leave the wishbone whole. Sever the two remaining sides of the breast in the same way as in the two-piece method, except remove and discard the heavy keel bone.

Functional Reading Skills

- Follow written instructions

Job Acquisition/ Development Skills

- Master specific job task/procedure
- Apply safety practices/ procedures
- Develop good work habits/attitudes

2. After fabricating the breast, lay the rest of the carcass on its side and remove the wings by pulling them back and cutting into and around the joint. Remove the legs and thighs in the same manner by pulling backwards and cutting around the joint where the thigh meets the back. Separate the thighs from the legs by pressing both together and cutting into and around the joint between the two. Finally, sever the two halves of the back by cutting between the thoracic and lumbar regions of the backbone.

3. After completing fabrication, cover the cuts and place them in a cooler.

4. Clean the work area and equipment. Put away tools.

JOB SHEET 1

Slaughter and process a chicken.

Student's name ______________________ Date ____________

Evaluator's name ______________________ Attempt no. ______

Instructions: When you are ready to perform this task ask your instructor to observe the procedure and complete this form. All items listed under "Process Evaluation" must receive a "Yes" for you to receive an overall performance evaluation.

PROCESS EVALUATION

Evaluator note: Write a check mark in the "Yes" or "No" blanks to designate whether or not the student has satisfactorily achieved each step in this procedure. If the student is unable to achieve this competency, have the student review the materials and try again.

The student:	Yes	No
1. Correctly bled the bird.	___	___
2. Correctly determined the temperature of the scalding water.	___	___
3. Correctly adjusted the temperature as necessary.	___	___
4. Scalded the bird correctly.	___	___
5. Chilled the bird after scalding.	___	___
6. Removed all feathers without damaging carcass.	___	___
7. Chilled the carcass to the correct temperature.	___	___
8. Removed the head, crop and windpipe correctly.	___	___
9. Accurately made the ventral incision and cut away the rectum without damage.	___	___

10. Removed entrails without breakage. ___ ___

11. Removed bile sac from liver correctly. ___ ___

12. Peeled the gizzard without breakage of the contents. ___ ___

13. Completely washed the carcass and placed it in the refrigerator. ___ ___

14. Cleaned work area and put away tools. ___ ___

EVALUATOR'S COMMENTS

____

____

____

PRODUCT EVALUATION

Evaluator note: Rate the student on the following criteria by circling the appropriate numbers. Each criterion must receive a rating of "3" or higher to demonstrate student mastery. (See Performance Evaluation Key.) A student who is unable to demonstrate mastery should review the material and submit another product for evaluation.

Criteria:

Bled correctly	4	3	2	1
Scalded correctly	4	3	2	1
Removed all feathers	4	3	2	1
No damage to carcass	4	3	2	1
Chilled carcass correctly	4	3	2	1
Removed head, crop, and windpipe correctly	4	3	2	1

Made ventral incision and removed rectum correctly	4	3	2	1
Removed entrails correctly	4	3	2	1
Peeled gizzard without breakage	4	3	2	1
Cleaned work area and put away tools	4	3	2	1

EVALUATOR'S COMMENTS

AVERAGE RATING

Evaluator note: To obtain an average rating for the competency profile, total the designated points in "Product Evaluation" and divide by the total number of criteria. Circle the rating on the "Performance Evaluation Key" below.

PERFORMANCE EVALUATION KEY

4 **Skilled** - Can perform job with no additional training
3 **Moderately Skilled** - Has performed job during training program; limited additional training may be required
2 **Limited Skill** - Has performed job during training program; additional training is required to develop skill
1 **Unskilled** - Is familiar with process, but is unable to perform job

PRACTICAL TEST 2 | *POULTRY PROCESSING* | *VIII*

JOB SHEET 2

Cut up a chicken.

Student's name ______________________ Date ____________

Evaluator's name ______________________ Attempt no. ______

Instructions: When you are ready to perform this task ask your instructor to observe the procedure and complete this form. All items listed under "Process Evaluation" must receive a "Yes" for you to receive an overall performance evaluation.

PROCESS EVALUATION

Evaluator note: Write a check mark in the "Yes" or "No" blanks to designate whether or not the student has satisfactorily achieved each step in this procedure. If the student is unable to achieve this competency, have the student review the materials and try again.

The student:	Yes	No
1. Fabricated breast correctly.	___	___
2. Removed wings correctly.	___	___
3. Fabricated legs correctly.	___	___
4. Fabricated thighs correctly.	___	___
5. Fabricated backs correctly.	___	___
6. Covered cuts and placed them in the cooler.	___	___
7. Cleaned work area and put away tools.	___	___

EVALUATOR'S COMMENTS

____

____

____

PRODUCT EVALUATION

Evaluator note: Rate the student on the following criteria by circling the appropriate numbers. Each criterion must receive a rating of "3" or higher to demonstrate student mastery. (See Performance Evaluation Key.) A student who is unable to demonstrate mastery should review the material and submit another product for evaluation.

Criteria:

Followed all cut lines	4	3	2	1
Left skin undamaged	4	3	2	1
Cut between joints	4	3	2	1
Divided backbone correctly	4	3	2	1
Covered cuts and placed in the cooler	4	3	2	1
Cleaned work area and put away tools	4	3	2	1

EVALUATOR'S COMMENTS

AVERAGE RATING

Evaluator note: To obtain an average rating for the competency profile, total the designated points in "Product Evaluation" and divide by the total number of criteria. Circle the rating on the "Performance Evaluation Key" below.

PERFORMANCE EVALUATION KEY

4 **Skilled** - Can perform job with no additional training
3 **Moderately Skilled** - Has performed job during training program; limited additional training may be required
2 **Limited Skill** - Has performed job during training program; additional training is required to develop skill
1 **Unskilled** - Is familiar with process, but is unable to perform job

WRITTEN TEST

POULTRY PROCESSING

VIII

Name ____________________ Score__________

OBJECTIVE 1

Match the terms associated with processing poultry to their correct definitions. Write the correct letters in the blanks.

___ 1. The process by which the brains of an animal are removed

___ 2. Boiling water is used to defeather birds having a large number of pinfeathers; is not used in the commercial market

___ 3. A process that includes removing the feathers from poultry by plucking rather than scalding

___ 4. Removal of the feathers from poultry

___ 5. Fine, nearly unnoticeable feather that looks like fuzz

___ 6. Feathers appearing at the entrance to the cavity of the bird

___ 7. The roof of the mouth of a bird.

___ 8. A method used to defeather a bird that has been "roughed" on a picking machine and dried by passing through the drying machine; next, the bird is dipped in melted wax and cooled; then the feathers are pulled from the body

a. Eviscerate

b. Slaughtering

c. Debraining

d. Dry-picking

e. Scalding

f. Wax-picking

g. Bleeding

h. Groove

i. Palate

j. Defeathering

k. Contour feather

l. Scorching

m. Vestigial feathers

n. Diminutive feathers

o. Barbules

p. Pinfeather

q. Hooklets

May be photocopied for student use.

___ 9. The removal of all non-edible parts of poultry such as the head, the crop, the windpipe, and the feet

___ 10. An undeveloped feather that is just emerging through the skin which can be difficult to remove and lowers the value of the carcass

___ 11. A method used to drain all of the blood from an animal

OBJECTIVE 2

Match the classes of chickens and turkeys to their descriptions. Write the correct letter in the blank.

Chickens

____ 1. Cross between a Plymouth Rock chicken and a Cornish. The age and characteristics of the bird determine the bird

____ 2. A young female or male chicken that is usually three to five months of age with tender meat, pliable skin, and a somewhat flexible breastbone

____ 3. A young male or female chicken that is usually under 13 weeks of age with tender meat, pliable skin, and flexible breastbone cartilage

____ 4. A mature male chicken that has coarse skin, toughened and darkened meat, and a hardened breastbone tip

a. Aged broiler

b. Broiler or fryer

c. Capon

d. Hen fowl or baking chicken

e. Mature

f. Roaster

g. Rock Cornish game or Cornish game hen

h. Rock Cornish fryer, roaster, or hen

i. Yearling

j. Cock or rooster

May be photocopied for student use.

_____ 5. A surgically castrated male chicken that is usually under eight months of age with tender meat and soft skin

_____ 6. A young, immature chicken that is usually five to six weeks of age and does not weigh more than two pounds at its ready-to-cook weight

Turkeys

_____ 1. Mature male or female turkey that is under 15 months of age with somewhat tender meat and reasonably smooth skin

_____ 2. A young male or female turkey that is under eight months of age with tender meat, pliable skin, and a breastbone cartilage that is somewhat less flexible than a fryer-roaster

_____ 3. A young, immature male or female that is usually under 16 weeks old with tender meat, pliable skin, and a flexible breastbone

_____ 4. A male or female turkey over 15 months of age with coarse skin and toughened flesh

a. Aged turkey

b. Capon

c. Cock or rooster

d. Fryer-roaster turkey

e. Mature or old turkey

f. Yearling turkey

g. Young turkey

May be photocopied for student use.

OBJECTIVE 3

Select from a list factors affecting the standards of quality of dressed and ready-to-cook poultry. Write an "X" in the blank before each factor.

_____ 1. Standards set by individual processors

_____ 2. Discolorations of the skin and flesh

_____ 3. Fleshing

_____ 4. Freezing defects

_____ 5. Defeathering

_____ 6. Inspector's preference

_____ 7. Conformation

_____ 8. Percentage of fat

_____ 9. Disjointed and broken bones and missing parts

_____ 10. Fat covering

_____ 11. Sex

_____ 12. Exposed flesh

OBJECTIVE 4

Discuss the selection and handling of birds prior to dressing.

1. What is the main factor to consider when selecting poultry for slaughter?

____

____

2. What kind of bird is usually selected for slaughter?

____

____

May be photocopied for student use.

3. Why is the handling of the bird previous to slaughter important?

____

____

____

4. In order for poultry to reach the ideal level of quality, what three factors are significant?

____

____

____

5. How long should feed be withheld from a bird that is to be slaughtered?

____

6. Why is it important to be accurate about the amount of time feed is withheld prior to slaughter of a bird?

____

____

____

7. Which birds have a lower keeping quality and bleed poorly?

____

____

____

OBJECTIVE 5 **List methods of bleeding a poultry carcass.** Write three methods in the spaces below.

____

____

____

May be photocopied for student use.

OBJECTIVE 6 **Discuss dry-picking and debraining of poultry.**

1. When is a fowl defeathered and debrained?

____

____

____

2. Why is puncturing the bird's brain necessary?

____

____

____

3. How soon should a bird be plucked after debraining?

____

4. Why is "roughing" of the bird done?

____

____

5. What is the rule for the order in which the feathers are removed?

____

____

6. What is the last step in the roughing process?

____

OBJECTIVE 7 **Choose the word or phrase to complete statements about scalding practices used to defeather poultry.** Write the correct letter in the blank.

_____ 1. Wax picking is combined with semi-scalding to defeather

a. all birds
b. chickens and turkeys
c. chickens, geese, and turkeys
d. geese and ducks

May be photocopied for student use.

____ 2. Birds are dipped in wax at 125-130° F. for

a. 30-45 seconds
b. 30-60 seconds
c. 60-90 seconds
d. 60-120 seconds

____ 3. A mechanical picker can be used with slack scalding because slack scalding

a. is more reliable than hot scalding
b. has more accurate temperature control
c. does not weaken the skin
d. keeps the flesh cooler than hot scalding

____ 4. Overscalding causes the bird to

a. have an overcooked appearance
b. be partially cooked
c. toughen
d. become harder to pluck

____ 5. The time it takes for feathers to loosen with the hot scalding method depends on

a. length of time in the water
b. water temperature
c. size of bird
d. age and sex of bird

____ 6. Semi-scalding or slack scalding uses controlled water temperature that improves the appearance of the bird and

a. leaves some discoloration, but less than hot scalding
b. produces more birds at higher grade
c. costs more than hot scalding
d. is used primarily in smaller processing plants

____ 7. For the hot scalding method, young birds require water temperature of less than

a. 110° F.
b. 130° F.
c. 150° F.
d. 212° F.

May be photocopied for student use.

_____ 8. Hard or hot scalding is

a. the most efficient method
b. the most popular method
c. not used commercially
d. not used for birds with many pinfeathers

_____ 9. Mature birds defeathered by hot scalding require temperatures of

a. 125-135° F.
b. 155-160° F.
c. 175-185° F.
d. 200-212° F.

_____ 10. The wax used for wax picking is hardened by

a. passing the bird under cold water spray
b. refrigerating the bird
c. freezing the bird
d. allowing the wax to reach room temperature

OBJECTIVE 8

Arrange in order the steps to eviscerate and truss a chicken. Write a "1" in the blank before the first step, a "2" in the blank before the second step, etc.

___ Sever the neck of the bird.

___ Remove the entrails.

___ Shape the bird.

___ Remove the windpipe and crop.

___ Remove the head of the bird.

___ Truss the bird.

___ Tie off the trussed bird.

___ Loosen the lungs from the chest wall.

___ Cut through the skin on the back of the neck and peel it down.

___ Cut the gizzard away from the intestines.

___ Remove the feet.

May be photocopied for student use.

___ Remove the bile sac from the liver.

___ Make an incision from the rear end of the keel bone to the rectum.

OBJECTIVE 9

Select from a list the various retail cuts of poultry. Write an "X" in the blank before each correct answer.

___ 1. Necks

___ 2. Combs

___ 3. Backs

___ 4. Tailbones

___ 5. Loin

___ 6. Wings

___ 7. Livers

___ 8. Breasts and wishbones

___ 9. Legs or drumsticks

___ 10. Flanks

___ 11. Thighs

___ 12. Roast

___ 13. Gizzards

OBJECTIVE 10

Select from a list handling and slaughtering factors which affect dressing percentage. Write an "X" in the blank before each correct answer.

___ 1. Appearance

___ 2. Weight

___ 3. Withholding feed

___ 4. Bleeding and removing feathers

___ 5. Age of carcass

May be photocopied for student use.

___ 6. Dressing

___ 7. Loading

NOTE: Objectives 11 and 12 are evaluated on job sheets/ assignment sheets in this unit. If you have not completed these components, see your instructor.

May be photocopied for student use.

WRITTEN TEST ANSWERS | *POULTRY PROCESSING* | *VIII*

OBJECTIVE 1

1.	c	7.	h
2.	e	8.	f
3.	d	9.	a
4.	j	10.	p
5.	n	11.	g
6.	m		

OBJECTIVE 2

Chickens		Turkeys	
1.	h	1.	f
2.	f	2.	g
3.	b	3.	d
4.	j	4.	e
5.	c		
6.	g		

OBJECTIVE 3

2, 3, 4, 5, 7, 9, 10, 12

OBJECTIVE 4

Discussion should include the following:

1. The appearance
2. A well-finished, thick-meated, and full-breasted bird
3. It is necessary to avoid bruises, abrasions, or broken limbs because they detract from the quality grade
4. Temperature, access to water, and proper ventilation
5. 8 to 10 hours
6. There will be a marked loss in dress yield if feed is withheld for more than 12 hours
7. Over-heated and over-excited birds

OBJECTIVE 5

Answer should include:

- Severing the neck
- Cutting the throat
- Cutting the veins

OBJECTIVE 6

1. Immediately after bleeding
2. Relaxes the feather muscles for easier removal
3. Within 2-3 minutes
4. To pluck and handle the bird in a manner that causes the least tears, abrasions, or bruises
5. Feathers are removed in the order in which the parts of the bird bleed out
6. Pinning

OBJECTIVE 7

1. d
2. b
3. c
4. a
5. b
6. b
7. c
8. c
9. b
10. a

OBJECTIVE 8

3, 8, 11, 4, 1, 12, 13, 5, 2, 10, 6, 9, 7

OBJECTIVE 9

1, 3, 6, 7, 8, 9, 11, 13

OBJECTIVE 10

3, 4, 6, 7

OBJECTIVE SHEET

CURING, SMOKING, AND SAUSAGE MAKING

IX

INTRODUCTION

Curing, smoking, and sausage making are ways to utilize less expensive cuts of meat in a way that adds unique flavor and storage life to the product. Curing or smoking meat was originally used to preserve meat, without refrigeration. Today, flavor and variations in appearance are the principle reasons for processing meat products in this manner. Over 7 billion pounds of meat are processed in this way each year, constituting a large and viable segment of the meat industry.

UNIT OBJECTIVE

After completing this unit, the student will be able to properly cure and smoke meat products and follow recipes for sausage making. The student will demonstrate these competencies by completing the job sheets and written test with a minimum of 85 percent accuracy.

SPECIFIC OBJECTIVES

After completing this unit, the student will be able to

1. Match terms associated with curing, smoking, and sausage making to their correct definitions.
2. Discuss the history of curing, smoking, and sausage making.
3. Select from a list the characteristics that prompt consumer decisions to buy smoked and cured meat products.
4. Choose the word or phrase to complete statements about meat curing ingredients.
5. Name the different methods of curing meat.
6. Discuss the procedure used in each of the different methods of curing meat.
7. Name different methods of introducing curing solutions.
8. Discuss curing solutions.
9. Discuss meat smoking procedures.
10. Match different types of sausages to their characteristics and ingredients.
11. Select spices according to their use in sausage making.

12. Choose the word or phrase to complete statements about nonmeat ingredients used in sausage making.

13. Choose the word or phrase that completes statements about different types of casings used in sausage making.

14. Read a salinometer. (Job Sheet 1)

15. Prepare a brine solution. (Job Sheet 2)

16. Prepare meat for smoking. (Job Sheet 3)

17. Pump a ham. (Job Sheet 4)

18. Prepare sausage. (Job Sheet 5)

19. Fill sausage casings. (Job Sheet 6)

CURING, SMOKING, AND SAUSAGE MAKING

PREPARATION

- Order materials to supplement unit.

  NOTE: See Suggested Resources.

- Review instructional outline for this unit. Modify time frames to suit class needs and plan activities for each class period.
- Study specific objectives to determine those you will cover in your presentation. Decide also which objectives should be taught to which students.
- Determine scope and sequence of objectives that you add. Design and develop support materials, including evaluation techniques, for additional objectives.
- Determine how you will schedule time for students to demonstrate competence in the required procedures.
- Make arrangements for guest speakers. Supply speakers with specific objectives and other appropriate sections of the unit.
- Prepare classroom.
  - Put up posters, charts, and other items dealing with curing, smoking, and sausage making.
  - Have articles, brochures, and other literature dealing with curing, smoking, and sausage making available for students.
- Arrange for all meat, supplies, and equipment needed for job sheets.

DELIVERY

Objectives 1 and 2

- Collect articles from trade publications such as the National Meat Purveyor concerning the history of sausage making.
- Have a senior citizen familiar with farm meat preservation talk about methods used before home refrigeration.

Objective 3

- Take a field trip to the supermarket to show students the various types of meat products that are cured and smoked.

Objectives 4 through 6

- Collect samples of different curing ingredients to show to the class.
- Allow the students to taste samples of meats cured with and without the various ingredients and using different methods of curing.

Objective 7

- Collect photographs of the different methods and equipment used to introduce curing solutions.
- Take a field trip to a processing plant to observe different methods of introducing curing solutions.

Objective 8

- Prepare different strengths of solution and allow the students to taste them.
- Demonstrate the preparation of pickle in class.

Objective 9

- Take a field trip to a commercial smoking plant to allow the students to see the smoking operation.
- Allow the students to taste samples of meat smoked using different types of wood to show the effect on meat flavor.
- Prepare meat that has been flavored using liquid smoke and allow the students to taste it.

Objective 10

- Collect different types of sausages to show the students variations in appearance.
- Cook different types of sausages to show students variations in the taste.
- Gather pictures of different types of commercially prepared sausage.

Objective 11

- Gather samples of the many spices used in sausage making and allow the students to taste them.
- Make a world map showing where different spices originate.
- Make a chart of the various sausages and the spices used in each.

Objective 12

- Collect samples of the various nonmeat ingredients used in sausage making.

Objective 13

- Gather different types of natural and artificial casings to show the students differences in each type.
- Collect entrails from a slaughtered animal and prepare casings from them.

APPLICATION

Objective 14 through 19

- Use Job Sheet 1 to provide students with the opportunity to develop skills in using a salinometer.
- Use Job Sheet 2 to provide students with the opportunity to develop skills in preparing brine solutions.
- Use Job Sheet 3 to provide students with the opportunity to develop skills in preparing meat for smoking.
- Use Job Sheet 4 to provide students with the opportunity to develop skills in introducing curing solution into meat cuts.
- Use Job Sheet 5 to provide students with the opportunity to develop skills in mixing sausage.
- Use Job Sheet 6 to provide students with the opportunity to develop skills in stuffing sausage.

EVALUATION

Practical Test

- Explain to students that they will be asked to demonstrate procedures on the job sheets to complete the practical test.
- Describe the rating scale used on the practical test.

- Give practical test.
- Reteach and retest as necessary.

Written Test

- Explain to students that they will be asked to demonstrate on the written test actions listed in the specific objectives.
- Give written test.

  NOTE: The written test may be given in sections if desired.

- Reteach and retest if necessary.
- Complete appropriate section of competency profiles.
- Review individual and group performance in order to evaluate teaching methods. Adjust scope, sequence, or instructional approaches for additional lessons as required.

SUGGESTED RESOURCES

Print Media

- Kutas, Rytek, *Great Sausage Recipes and Meat Curing*, Rytek S. Kutas Company, Buffalo, New York, 1976.
- Romans, John R., Kevin W. Jones, William J. Costello, C. Wendell Carlson, and P. Thomas Zigler, *The Meat We Eat*, The Interstate Printers and Publishers, Danville, Illinois, 1985.
- Levie, Albert, *Meat Handbook*, Van Nostrand Reinhold Company, New York, 1979.
- *Meat Processing Plant Employee*, Vocational Instructional Services, Texas A & M University, College Station, Texas, 1985.

UNIT REFERENCES

- Kutas, Rytek, *Great Sausage Recipes and Meat Curing*, Rytek S. Kutas Company, Buffalo, New York, 1976.
- Romans, John R., Kevin W. Jones, William J. Costello, C. Wendell Carlson, and P. Thomas Zigler, *The Meat We Eat*, The Interstate Printers and Publishers, Danville, Illinois, 1985.
- Levie, Albert, *Meat Handbook*, Van Nostrand Reinhold Company, New York, 1979.
- *Meat Processing Plant Employee*, Vocational Instructional Services, Texas A & M University, College Station, Texas, 1985.

INFORMATION SHEET

CURING, SMOKING, AND SAUSAGE MAKING *IX*

OBJECTIVE 1

Match terms associated with curing, smoking, and sausage making to their correct definitions.

- **Cure** — The addition of ingredients to meat to aid in its preservation or the particular ingredients themselves
- **Dextrose** — An inexpensive sweetener, derived from corn, which is used as a sweetener in some sausages
- **Nitrosamines** — Suspected carcinogen that is chemically formed during the process of cooking from nitrates and nitrites present in cured meats
- **Overhauling** — The changing of position of cuts during the immersion cure process to enable the curing solution to reach all parts of the meat
- **Phenolic fraction** — Chemical compound contained in wood smoke which gives smoked meat a smoky aroma and flavor
- **PPM** — Tested measurement of trace compounds given as parts per million of meat tested
- **Product bind** — The ability of the ingredients in a ground product to stick together
- **Salinometer** — A device used for testing the strength of a pickling solution
- **Sucrose** — Sugar extracted from sugar cane or beets which is used as a sweetener in some sausages

OBJECTIVE 2

Discuss the history of curing, smoking, and sausage making.

Before refrigeration, it was difficult or impossible to completely use the meat from a slaughtered animal before it spoiled. In warmer climates or during the summer, meat was seldom eaten from larger animals because of the chance of spoilage.

To prevent this spoilage, people devised ways of preserving meat by adding ingredients that slowed or prevented the bacteria that caused spoilage. Salting was the first method used to preserve meat. Historical records show that as early as 3000 B.C. the Samarians were using salt to preserve meat and fish. Other cultures also smoked and sun-dried meat as a means of preservation.

As trade with different areas increased, various spices and products came into use that would mask the taste of slightly rancid meat. This availability of spices is what lead to the popularity of sausage making. In fact, the word sausage is derived from a Latin term which means "preserved." Generally, the climate of a particular area determined the particular types of sausage produced. In the warmer areas of Italy and Spain, dry sausages such as pepperoni were preferred because of the longer period of preservation. In Germany and Denmark, fresh and cooked sausages such as bologna were popular because they would last in the cooler climate. Sausage makers in different areas of Europe became quite proficient at manufacturing many different types of sausages which were extremely popular with the consumer.

Today, because of refrigeration, we are less interested in the preservation qualities of cured meats. The taste and variety of cured meat products are the important reasons why the public consumes 7 billion pounds of cured meat products each year in the United States.

OBJECTIVE 3

Select from a list the characteristics that prompt consumer decisions to buy smoked and cured meat products.

Consumers who eat cured or smoked meat products are influenced in their decisions to buy such products because of the following characteristics:

- Color development

  NOTE: The aesthetically pleasing pink color of cured meat is not a function of the smoking process but is produced by the chemical reaction of the meat with nitrites added in the curing process. Without the addition of nitrites, cured meat would have an unappealing, grayish-green color and a flat salty flavor.

- Flavor development
- Preservation

  NOTE: The curing of meat, on a chemical level, is basically the addition of chemical agents to the meat which create an unfavorable environment for bacterial growth. Most bacteria, yeasts, and molds responsible for meat spoilage are inhibited by the presence of salt.

- Shelf life

OBJECTIVE 4

Choose the word or phrase to complete statements about meat curing ingredients.

Ingredients are added to meat in the curing process which serve specific purposes in the preservation and taste of the product.

Salt

Salt is the most important ingredient in the curing formula. It constitutes the bulk of the curing mixture because it is a good preservative and enhances the flavor. The meat product can be packed in dry salt or injected with a salt solution called a pickle. In the past, a high salt content was desired in a cured meat product to increase its shelf life. This method produces an objectionable salty taste which today's consumers dislike. Today, with refrigeration, the preservation aspects are not as important, so less salt is used in curing meat.

Sugar

To mask the harshness of the salt flavor in cured meats, sugar is added. It lowers the pH of the cure and enhances product flavor. Sugar also aids in the retention of water in the product.

Nitrite and Nitrate

Sodium nitrate occurs naturally in vegetables and water. It was used accidentally in meat preservation for many years because it is an impurity in salt. Sodium nitrite, a derivative of sodium nitrate, is also used to cure processed meats. When nitrates are used to cure meat (country-cured hams), it is rapidly converted to nitrites by bacterial action or by the use of a reducing agent such as ascorbate. Nitrite is an essential meat curing agent because it performs several useful functions:

- Prevents botulism and the growth of other bacteria thus safeguarding against the mishandling of meat by manufacturers, distributors, retailers, or consumers.
- Fixes meat color resulting in the characteristic pink color of cured meat.
- Prevents the undesirable flavor caused by the oxidation of lipids in the curing process.
- Provides cured meat with a characteristic "cured flavor."

Several years ago, scientific research determined that nitrates in meat could possibly be converted into nitrosamines during the cooking process. Nitrosamines have been linked to increased cancer levels in laboratory animals. Although the levels of nitrosamines ingested in meat is much less than in certain vegetables, the USDA determined an acceptable level of nitrates in meat which would still prevent spoilage and reduce the levels of nitrosamines. If no nitrates were used, the number of cases of sickness and death caused by botulism poisoning would far exceed those of cancer resulting from the ingestion of nitrates in meat. Current regulations allow nitrates to be used only in the processing of dry-cured country ham, bacon, and dry sausages with only 3.5 ounces of potassium or sodium nitrate used per 100 pounds of meat. Sodium nitrite can be used in all meat at a level of 2 ounces per 100 gallons of pickle or 1 ounce per 100 pounds of salt with only a 200 PPM (parts per million) level of nitrite in the finished product.

Sodium Erythorbate and Ascorbate

Adding sodium erythorbate or ascorbate (vitamin C) to the pickling solution speeds up the time needed for cured meats to develop their characteristic pink color. They also convert nitrates to nitrites when they are used in the curing process. Federal regulations allow the use of these chemicals at the rate of 75 ounces of ascorbic acid or 87.5 ounces of sodium ascorbate or erythorbate per 100 gallons of pickling solution. The fading of the cured meat color on exposed surfaces due to light can be alleviated by spraying a 5 percent solution onto the meat before it is packaged.

Alkaline Phosphate

In the curing process the salt in the pickle has a tendency to extract water from the meat. A 10 percent loss in weight means a reduction in profit for the processor. This can be alleviated by adding alkaline phosphate to the pickle at a rate of 5 percent.

Spices

The flavor of ham can be enhanced or changed by adding various spices to the pickling solution or by rubbing them into the ham during the curing process. Different specialty hams require different spices. Some of the commonly used spices are pepper, cinnamon, cloves, nutmeg, and allspice.

Water

The functions of water in the curing process are the following:

- Replaces water lost in cooking.
- Assures the ham is moist and juicy.
- Acts as a carrier for the solid ingredients of the pickle.

- Increases weight and reduces cost by adding water above the amount naturally present.

When water is added to the point that the percentage of fat free lean falls below a certain percent (from 16 to 20.5 percent depending on the cut) then the label must show the amount of water as a percent of weight.

OBJECTIVE 5 **Name the different methods of curing meat.**

Many different methods of curing meat are used worldwide. Some of the most predominant methods used in the United States are:

- Dry salt cure
- Dry sugar cure
- Box cure
- Hot salt cure
- Sweet pickle cure

OBJECTIVE 6 **Discuss the procedure used in each of the different methods of curing meat.**

Dry Salt Cure

The oldest method of salt curing is the dry cure method which consists of rubbing and packing meat cuts in dry salt for long periods of time. This extended exposure to salt leaves a heavy salt content and an objectionable, salty flavor. Today this method is used only in the production of salt pork such as fat back and jowls for use as seasoning meat.

Dry Sugar Cure

The dry sugar cure, sometimes called the dry country cure, is the best method of curing for individuals and small meat processors who do not have refrigerated curing rooms and injection equipment. This method is faster than immersion curing and is safer at a wider range of temperatures. This method is appropriate for beginning curers and will tolerate many mistakes and still yield a desirable product.

A widely used formula consists of 8 pounds of salt, 3 pounds of cane sugar, 2 ounces of nitrate and 1 ounce of potassium or sodium nitrite. This is commonly referred to as the 8-3-2-1 formula.

For each pound of pork, 1 ounce of cure is used. The cuts are hand-rubbed several times at five-day intervals and placed on shelves to cure, making sure that they do not touch the brine extracted in the curing process. Large cuts, such as hams, require 7 days per inch of thickness for an accurate cure. For instance, a 15 pound ham that measures 5 inches in thickness will take 35 days to cure and a belly for bacon that is 2 inches thick will require 14 days to cure.

Box Curing

The box curing method, although not used as extensively as it once was, is used by processors who prefer a mild-cured product. Cuts are rubbed with about ¾ ounce of cure to the pound of bacon. They are placed in boxes or curing vats with a lid that fits tightly inside the container. Weights or a screw jack system are used to exert pressure upon the lid which is pressed down onto the bellies. The bacon under pressure forms a brine which rises above the meat sealing it from the air. When the proper amount of cure is added the length of time spent in the curing process is unimportant because the meat cannot become too salty. Packers on occasion have used this method as a way to store cuts, leaving the bacon in the solution for up to 90 days.

Hot Salt Cure

The hot salt process is one that is used in only a few locations in the United States. It has been tested successfully and is a viable method for individuals and small processors to use. Hams are rubbed with one ounce of nitrate followed immediately by rubbing with brown sugar. After the ham has set for a few hours to allow the ingredients to be absorbed, it is packed in salt that has been heated to a temperature of about 120°F. Cotton gloves should be worn because of the heat of the salt. After the ham has been packed for about 5 minutes it should become soft. Using a small wooden stick about the size of a pencil, force the hot salt into the aitch bone joint. Finally, rub the ham with about ¾ of an ounce of hot salt per pound of meat. Allow the hams to set for 5-7 days in order to absorb the cure and then rub with black pepper and smoke.

Sweet Pickle Cure

When sugar is added to a brine solution it is called a sweet pickle. Sugar and salt in a sweet pickle solution should be about 75-85° on a salinometer. To achieve an 85° pickle, mix about 8 pounds of salt, 3 pounds of sugar, ¼ pound of sodium nitrate and 4 gallons of water. After mixing the ingredients, heat the solution to the boiling point to ensure that the ingredients are completely dissolved. Allow the curing solution to cool before pouring it over the meat.

The degree of pickle determines the length of time for curing to take place. Below are some different curing times for solution strengths.

85° pickle	9 days per inch
75° pickle	11 days per inch
60° pickle	13 days per inch

Meat cuts that are to be cured should be chilled before curing. Curing vats should be made of noncorrosive materials such as plastic, fiberglass, crock, or stainless steel. The high salt content will corrode steel giving an objectionable flavor to the meat, so steel barrels should never be used. Curing vats should have a tight fitting lid to reduce air contamination. Meat cuts should be packed in the vat with the hams on bottom, shoulders next, and the bacon on top. This is because the cuts are of varying thicknesses and thicker cuts require longer curing times. If the cuts are tightly packed in the barrel, about four gallons of pickle should be required to cover the meat. The meat should be overhauled or turned once or twice during the curing process to permit the pickling solution to reach all parts of the meat.

To achieve an optimum level of curing on all cuts, it is necessary to closely follow the length of time directed for each cut. For example, if a 75° pickling solution is used, then the cuts must be cured 11 days for each inch of thickness. This means that the 2-inch thick bacon should come out of pickling solution on the 22nd day. Shoulders, if they are 4 inches thick, should come out on the 44th day and 5-inch hams should come out on the 55th day. The best curing action occurs at a temperature of 35-40° F., although successful curing can be accomplished at as high as 50° F. Temperatures over 50° F. will sour the brine, which is an indication of bacterial growth. An "off flavor" will develop in the hams and souring of the meat around the bone will occur.

To insure complete curing and prevent spoilage, inject about four to eight ounces of curing solution into the center of the ham and around the hip joint to ensure even distribution of the curing solution throughout the ham.

OBJECTIVE 7

Name different methods of introducing curing solutions.

The best way to ensure even curing and speed the curing process is to inject curing solution into different parts of the meat cut. In an immersion cure, the curing ingredients must be absorbed into the meat for curing to occur. In cuts such as hams or shoulders where the center of the cut may be three inches from the nearest surface, it takes a long period of time for the curing ingredients to be absorbed. This long absorption time increases the chance of bacterial spoilage at the center of the cut and increases the costs of curing because of the long turn-around time for curing a batch of meat. The best way to alleviate this problem is by injecting the curing solution into the various parts of the cut. This shortens the time needed for the curing process by one-third and produces a high quality product which has an even cure throughout the cut.

Plunger-Type Syringe

In a home curing situation, most of the more mechanized methods of injection are too expensive to be feasible. A plunger type syringe is a reasonably priced alternative. A syringe is a more time consuming and labor intensive method of injection, but is used because of its low cost.

Pump Pickler (Stitch Pump)

In larger operations, a motor driven pump is used to pump pickling solution to an injector with a trigger valve that allows the operator to pump solution into the meat cut. An arterial pump is another method used to pump hams. A small needle attached to a pump exerting 40-50 pounds of pressure is inserted into the femoral artery at the butt of the ham. Then the injection fluid is injected into the arterial system of the ham, dispersing pickle throughout. Usually a weaker, 60-65° pickle is used.

Mechanized Pumps

In large operations, electronically automated pumping machines are used to automatically inject a prescribed amount of solution into the ham. Operators who have limited experience can use these machines and do an excellent job of curing.

OBJECTIVE 8 **Discuss curing solutions.**

Curing solutions consist of solids such as salt, sugar, nitrates, and spices dissolved in water. The higher the percentage of dissolved ingredients, the higher the strength of the solution. Solution strength is measured in degrees of pickle. This strength can be measured using an instrument called a salinometer which consists of a glass tube with a weight in the bottom under vacuum. The higher the strength of the solution, the higher the salinometer will ride in the solution. If the salinometer is placed in water, it should read zero degrees or ride deep in the water. Most pickling solutions vary from a 60° to 95° solution. Every time a solution is mixed it should be checked with a salinometer to accurately determine the degree of pickle.

The higher the degree of pickle, the shorter the period of curing. When using a higher degree solution care must be taken not to over cure the meat resulting in a product with an objectionable salty flavor. The following table gives the proportions of ingredients needed to formulate different degrees of pickle.

Cold Water		Salt	Sugar	Sodium Nitrite	Salinometer 40°
gal.	*lbs.*	*lbs.*	*lbs.*	*oz.*	*Degree of Pickle*
5	41⅔	6	3	¼	60°
5	41⅔	7	3	¼	65°
4	33⅓	6	3	¼	70°
5	41⅔	8	3	¼	75°
4	33⅓	8	3	¼	85°
5	41⅔	10	3	¼	85°
4	33⅓	9	3	¼	90°
4	33⅓	10	3	¼	95°

OBJECTIVE 9

Discuss meat smoking procedures.

Smoking meats not only aids in preservation but also creates a pleasant smoky flavor. Smoking preserves meat by removing the water. Originally, meat was smoked in a large building with pits dug in the floor. Fires were started in the pits and when the fires were reduced to coals, hardwood or sawdust which had been soaked in water was thrown on the coals to produce a large volume of smoke. An inevitable result was ash-covered meat. Today more efficient smokers have been devised. Natural gas burners, which are thermostatically controlled, are used to heat the smoker to the precise temperature for optimum smoking. Next, a smoke generator located outside of the building is fired up and the smoke it produces is filtered through water before entering the smoker through a pipe. This method reduces shrinkage due to water loss.

Before cuts can be smoked, they need to be washed under running water to remove any salt or cure present on the surface. It is also critical that the surface of the cut be slightly moist when placed in the smoker. Wet cuts will develop a streaked appearance when smoked. Dry cuts will be pale in color due to the poor adherence of the smoke to the product.

Only hardwoods are used for smoking. Hickory is by far the most popular wood. Other hardwoods such as mesquite, apple, maple, ash, oak, cherry, and other fruit woods are commonly used. Pine and other conifers should be avoided due to their high tar content, which produces a bitter flavor.

Liquid smoke, which contains the phenolic fraction of smoke, is made by condensing wood smoke through water and distilling it. Liquid smoke may be applied in some commercial applications to obtain the desired smoky flavor while decreasing the smoking time.

Meat is usually smoked for 12 hours to 3 days, depending on the thickness of cut, in a smokehouse with a temperature of 120°-125° F. Exercise care to ensure the internal temperature of the meat does not exceed 122°F. because this will greatly reduce the keeping qualities.

NOTE: Today most smoked meat products are smoked strictly for improved flavor. Products that are labeled "pre-cooked" are heated to an internal temperature of 140 degrees.

OBJECTIVE 10 **Match different types of sausages to their characteristics and ingredients.**

Sausages are one of the oldest forms of processed meats. They predominantly originated in European countries. Spices and different methods of processing produce many variations, of which, over 200 different kinds are produced commercially in the United States today.

Sausages are generally grouped according to the processing methods used in their production. They are usually grouped according to the following classifications.

Fresh Sausage

Fresh sausage is made by grinding cuts of fresh meat and adding spices. It must be stored frozen or refrigerated up to the time of consumption. Fresh sausage is very perishable and should be completely cooked before serving. Some examples of fresh sausage are:

- **Fresh pork sausage** — Made from fresh pork and contains spices such as black pepper, sage, salt, thyme, nutmeg, and ginger and is the most common sausage eaten in America. Commercial processors usually produce fresh pork sausage using the whole hog, mostly large sows.
- **Kielbasa** — A coarse-ground mixture of pork and beef with spices added, including garlic. Some processors sell this sausage under the name "Polish sausage."

- **Bockwurst** — A veal and pork sausage with spices similar to a frankfurter.

- **Chorizos** — A highly spiced, hot Spanish sausage, about the size of a large frankfurter, made from coarse cut pork.

- **Bratwurst** — Pork and veal sausage made without nitrite thus giving it a white color. Also known as white hots, this sausage contains mace, ginger, nutmeg and white pepper in a hog casing.

- **Thuringer** — Pork sausage containing black pepper and ginger, similar to breakfast links in taste.

Uncooked Smoked Sausages

These sausages are smoked but not cooked prior to sale. Most of these sausages are sold vacuumed packed and must be kept refrigerated.

- **Smoked pork sausage** — A coarse-ground beef and pork sausage, also called Polish sausage.

- **Mettwurst** — A spreadable product that includes pork, veal, and garlic that is sold in ring form and is closely related to teawurst. It is used as a sandwich spread.

Cooked Sausages

Cooked sausages are cured during processing, fully cooked, smoked, and refrigerated until consumed. Many cooked sausages are vacuumed-packaged and will keep only seven days after the package is opened. These sausages are fully cooked and ready to eat. Examples in this class include the following:

- **Frankfurter** — A more common name for this popular sausage is the "wiener." This sausage is a blend of beef, pork, and/or poultry meat that is mildly seasoned with paprika and other spices then smoked. Poultry and red meats are combined to produce wieners at a lower production cost. The "old fashioned" or "old style" frankfurters are German style frankfurters made of veal and stuffed into natural casings.

- **Bologna** — The second most popular sausage sold in America, is finely ground beef and/or pork that is mildly seasoned and fully cooked.

- **Beerwurst** — A coarse-ground German style salami that consists of beef and pork, spiced with garlic. It is considered a big sausage since the diameter is usually 2½ to 3½ inches. The meat is stuffed into veined natural casings or vein-decorated artificial casings.

- **New England sausage** — A type of bologna that is coarse-ground pork with pieces of ham or chopped beef interspersed in the emulsion. Also known as Berliner sausage. It comes in either chub form, Leona bologna, or in stick form, jagwurst.
- **Mortadella** — A type of bologna made from very finely chopped pork and beef with cubes of pork fat suspended in the emulsion and smoked briefly at a high temperature prior to air drying. Mortadella sausages are usually stuffed in large diameter beef bladders.
- **Vienna sausage** — A popular canned wiener that is small and has a rather bland taste.
- **Knackwurst** — A coarse-ground beef, pork, and veal sausage that is smoked to a reddish-brown color, seasoned with garlic or onion and other spices and stuffed into a natural casing. Also known as schueblig.
- **Thuringer links** — Made mostly from pork, although beef and veal are sometimes added in small quantities. This term is used interchangeably with summer sausage. Thuringer is also sold fresh.

Dry and Semi-dry Sausages

These sausages usually have a tangy flavor which results from a carefully controlled bacterial fermentation process that causes the sausages to have a lower pH. They are made from fresh meats which are cured during processing and possibly smoked. Dry sausages, which require long drying periods, are generally not cooked and include salami and pepperoni. Cool storage is recommended for this type sausage. Semi-dry sausages, often fermented and cooked in a smokehouse, require refrigeration. Dry and semi-dry sausages include the following:

- **Summer sausage** — Fermented, semi-dry sausages made from pork, sometimes beef and veal are added. Also called thuringers.
- **Cervelat** — Another term sometimes interchanged with summer sausage and thuringer. It is a mildly flavored semi-dry sausage that is softer in consistency than the Italian salamis. Farm style cervelat is a summer sausage type mixture of equal parts of beef and pork that are rough chopped and mildly seasoned. The mixture is stuffed into 1½-inch diameter casings of various lengths. Examples of cervelat sausages include Farm style, Goettinger, Goteborg, Gothaer, Holsteiner, Landjaegar, and Thuringer.

- **Salami** — An Italian sausage made from coarse-ground pork that is seasoned with garlic and other spices. Traditional salamis have twining or cording for decoration and to give support during fermentation and drying. There are many types of salamis.

- **Frizzes** — Lean, cured pork that is highly seasoned, rough chopped, and stuffed into hog middles.

- **Lebanon bologna** — Semi-dry, all beef product characterized by a very heavy smoke and a very acidic flavor. It originated in the Pennsylvania Dutch culture.

- **Pepperoni** — Hotly spiced, coarse ground pork and beef sausage with ground red pepper as the major flavor ingredient. It is also known as kabanossi.

- **Lyons sausage** — Made of four parts fine chopped, lean pork and one or two parts diced pork fat, seasoned with garlic and other spices, and stuffed into large diameter casings.

- **Landjaegar** — A mixture of pork and beef seasoned with garlic and caraway seeds. Also known as "hunter's sausage." It is stuffed into hog casings, cut into double links, and pressed flat between weighted boards to give it a square appearance.

- **Sopressata** — A sausage made from coarse chopped pork and seasoned with whole black pepper. It is stuffed into wrinkled casings made from hog middles.

OBJECTIVE 11 **Select spices according to their use in sausage making.**

Spices refer to any aromatic vegetable substances that are broken or ground and added to food to season and flavor rather than add nutritional value. These pungent properties constitute a vast number of spices, seasonings, and flavors. By combining different amounts with meats, the unique combinations offer infinite varieties to the consumer. Since the number of spices used in sausages is too large for all spices to be mentioned, the following is a list of the most widely used spices.

- **Allspice** — Has a pungent clove-like odor and taste and is reddish-brown. It is available in whole and ground form. Allspice is used in bologna, pork sausage, frankfurters, hamburger, mincemeat, potato sausage, headcheese, and many other meat products.

- **Anise seed** — Egg-shaped seeds that are greenish in color and are available in whole or ground form. Anise seeds are typically used in making dry sausage such as mortadella and pepperoni.

- **Basil** — Greenish bits of leaves which produce an aromatic, anise-like pungent taste. Basil is used in making pizza sausage.

- **Caraway seed** — Brown seed with a characteristic odor and a slightly sharp taste. They are available only in whole seeds and are used in making Polish sausage.

- **Cardamon seed** — A small, angular reddish-brown seed that is available in whole, hulled, and ground form. The cardamon seed has a slightly sharp taste and a pleasantly fragrant odor and is used in bologna, frankfurters, and similar products.

- **Chili powder** — Consists of various spices such as garlic, chili pepper, cumin, oregano, salt, and other ingredients. The shade of red varies according to the additives. Chili powder is used in some Spanish and Mexican sausages.

- **Cinnamon** — Is a tan to reddish-brown quill of rolled bark that is either whole or ground. It has an agreeably aromatic odor and a sweet, pungent taste. Cinnamon is used in ham loaf, other pork loaves, blood sausage, mortadella, pastrami rub, and sometimes in bologna.

- **Cloves** — Reddish-brown spice that is ½ to ¾ inches long and has a strong, pungent, and sweet odor and taste. Cloves can be either ground or whole and are used in liver sausage, bologna, frankfurters, headcheese, corned beef, and pastrami. Baked hams sometimes have whole cloves stuck in them to add flavor while cooking.

- **Coriander seed** — Yellowish-brown, globular-shaped seeds that are available in whole or ground form. They have a distinctive fragrance and a lemon-like taste. These seeds are used in frankfurters, Polish sausages, knackwurst, bologna, and many other cooked sausages.

- **Cumin** — Elongated, oval seeds that are yellowish-brown in color and are available in whole or ground form. Cumin has a distinctively strong, aromatic odor and the taste is somewhat bitter. This spice is used to make curry powder and used in chorizos, as well as other Mexican and Italian sausages.

- **Fennel seed** — Green to yellowish-brown oblong or oval seeds that are ground or whole. This spice is much like anise in odor and has an extremely pungent flavor. Italian sausages, pizza sausage and pizza salami contain fennel seed.

- **Garlic** — A white spice that comes in powdered, granulated, ground, minced, chopped, and sliced form. Garlic has a distinctive odor and is extremely pungent in taste. This spice is used in many products, such as Polish sausage, frankfurters, bologna, salamis, and most beef products.

- **Ginger** — Comes in whole, ground, or cracked form. Ginger has a buff-colored appearance and a spicy, sweet odor. The taste is rather hot. It is used in pork sausage, knackwurst, frankfurters, and many other cooked sausages.

- **Mace** — Is somewhat like nutmeg but stronger and less delicate in taste and odor. Mace is flat, brittle pieces of lacy material and is usually yellow to brownish-orange in color. It is available in whole or ground form and is used in making bologna, mortadella, bratwurst, bockwurst, and many other fresh and cooked sausages.

- **Marjoram** — A whole or ground spice that consists of small pieces of grayish-green leaves. Like oregano, it has a slightly bitter, camphor-like taste. It is used in Braunschweiger, liverwurst, headcheese, and Polish sausage.

- **Mustard** — Tiny, smooth, nearly globular shaped seeds that are yellowish or reddish in color, available in whole or ground form. Yellow mustard has no odor but has a sharp taste when water is added. Brown mustard has a sharp irritating odor when added to water and a pungent taste. Typical uses for mustard are in bologna, frankfurters, salami, summer sausage, and similar products.

- **Nutmeg** — Ovular seeds that are large and brown and available in whole and ground form. Nutmeg has a sweet, warm odor and taste and is used in making bologna, frankfurters, minced ham sausages, liver sausage, and headcheese.

- **Onion** — A popular white spice that is powdered, granulated, ground, minced, chopped, or sliced. A sweetly pungent odor and taste are representative of this spice. Onion is used in braunschweiger, liver sausage, headcheese, and baked luncheon meat.

- **Oregano** — Small pieces of green leaves that have a strong, pleasant, somewhat camphor-like odor, and taste. Oregano is predominant in most Mexican and Spanish sausages as well as being mixed into Italian sausage, frankfurters, and bologna.

- **Paprika** — A finely ground bright rich-red to brick-red spice that is used in frankfurters, bologna, Italian sausage, and many other cooked and smoked sausage products.

- **Black pepper** — Available in whole, ground, cracked and hulled form, this spice comes from "green" or unripe pepper berries that are brownish-black in color. Black pepper has a penetrating odor and a hot, biting taste. It is the most popular spice and is used in frankfurters, bologna, pork sausage, salamis, liver sausage loaf products, and most other sausages.

- **Red pepper** — Oblate-shaped and elongated red pods available in whole or ground form. Red pepper has a characteristic odor and "heat levels" ranging from mildly to intensely pungent in taste. This spice is used in making chorizos, smoked country sausage, pepperoni, fresh pork sausage, and many others.

- **White pepper** — Much like black pepper but less pungent. It is available in whole or ground form and comes from ripe, yellowish-gray pepper seeds. White pepper is used where black pepper specks are not wanted, such as in pork sausage and deviled ham.

- **Saffron** — Orange and yellow strands that are available in ground or whole form. Saffron has a strong, medicinal-type odor and a bitter taste. It is the most expensive of all the spices and is used primarily for color. It is rarely used in sausage making.

- **Sage** — Lance-shaped leaves that are grayish-green in color. Sage is available in whole, cut, rubbed, or ground form. It is highly aromatic and has a strong, slightly warm, bitter taste. Pork sausage, pizza sausage, breakfast sausage, and old fashioned loaf contain sage.

- **Savory** — Dried, greenish-brown leaves that are available in whole or ground form. Savory has an aromatic odor and is used primarily in pork sausage, but is good in other sausages as well.

- **Thyme** — Gray to greenish-brown leaves that are available in whole or ground form. Thyme has a fragrant, aromatic odor and a warm, quite pungent taste. It is used in pork sausage, liver sausage products, headcheese, and bockwurst.

- **Tumeric** — A finely ground spice from yellowish-orange fibrous roots. Tumeric has a characteristic odor much like that of pepper though the taste is slightly bitter. Like saffron, tumeric is used more for color than flavor. Most curry powder contains some tumeric.

OBJECTIVE 12 **Choose the word or phrase to complete statements about nonmeat ingredients used in sausage making.**

Many different nonmeat ingredients are used in making sausage. These ingredients add variations in flavor, provide certain functional properties, prolong the shelf life of the product, and insure the safety of the final product. Many of the ingredients are used for economical production purposes. However, salt is a necessary ingredient that must not be omitted. Regulations of allowable levels of nonmeat products vary with the type of ingredient. Several nonmeat additives are listed below.

- **Salt** — Is essential in sausage manufacturing and serves three primary functions: preservation, flavor enhancement, and protein extraction which makes the sausage ingredients stick or bind together. Salt acts to enhance the binding properties of the ground meat by activating two proteins, actin and myosin. This insures that the fat does not coalesce into large fat pockets or migrate to the surface to form fat caps during cooking. The most commonly used salt is sodium chloride since it is highly soluble, is readily available, and has the most desirable flavor.

- **Water** — Used for better emulsion and to add moisture to the meat. It is added in the form of ice during the chopping or mincing process to hold the temperature of the meat batter down, thus insuring stability of the batter. Water makes the meat juicer and aids salt by helping to dissolve the meat proteins for binding fat.

- **Nitrite** — Brings out the color and flavor properties of sausage products. It is derived from nitrate through a bacterial breakdown during the long curing process. It is added directly to the sausage batter, usually in the form of sodium nitrite. There are four primary functions of nitrites in the sausage making process: develop the characteristic pink, cured meat color, provide powerful antioxidant properties, improve flavor, and provide bacteriostatic properties. It prevents the meat from becoming rancid and prevents the consumer from getting food poisoning such as botulism. Extreme caution is required when adding this ingredient to meat since too much nitrate or nitrite has been linked to increased cancer risks in laboratory animals. It is strongly recommended that a commercial premixed cure be used when nitrite or nitrate is called for in a formulation.

- **Ascorbate and erythorbate** — Are derived from vitamin C and speed up the curing reaction in sausage making. They seem to inhibit the formation of nitrosamines which are a suspected carcinogen. Residual amounts of these compounds present in the finished product add stability to the cured color by reducing the deterioration rate.

- **Sugars** — Are sweetening agents such as sucrose and dextrose that are primarily used to counteract the salty flavor of salt-cured sausages. Sugar also provides food for the microbial fermentation in dry sausages. Most sugars increase the browning of the product during cooking. Dextrose or corn sugar is necessary in fermented sausages because fermentation bacteria require a simple sugar to produce lactic acid.

- **Antioxidants** — Retard rancidity of meat by preventing oxidation of fat. The USDA publishes regulations of the allowable levels of antioxidants which may be used.

- **Phosphates** — Function as a water-binding compound, act as an antioxidant, dissolve proteins, and help to stabilize and protect the flavor and color of the finished product. By using phosphates in the production of sausage, manufacturers attain a longer shelf life for the product and improve the smokehouse yield. There are numerous kinds of phosphates that have been approved for use in sausage making.

- **Mold inhibitors** — Inhibit the growth of mold. Usually sausages are dipped in a solution of potassium sorbate and propylparaben to prevent mold growth.

- **Glucono Delta Lactone (GDL)** — Produces an acid tang, similar to natural fermentation, and speeds up the curing process.

- **Extenders** — Include many ingredients that are used to reduce the cost of the finished product. Extenders are also used for better binding, texture, and flavor of the meat product. They include such compounds as soy protein, cereal flours, sodium caseinate, and nonfat dry milk.

- **Spices, seasonings, and flavorings** — Include a broad spectrum of products used in the flavoring of sausage.

OBJECTIVE 13

Choose the word or phrase that completes statements about different types of casings used in sausage making.

Sausage casings can either be natural or manufactured. Manufactured casings constitute the vast majority of casings used to stuff sausage products today. Uniformity, versatility, and price are contributing factors to the popularity of manufactured casings as opposed to natural ones. Animal casings or natural casings are made from the intestines, stomachs, or bladders of sheep, cattle, and hogs. Natural casings are inverted, flushed with water, and scraped before using. Casing processors are responsible for the final cleaning, scraping, sorting, grading, and salting of the casings.

Hog Casings

Hog casings include bladders, small casings, middles, bungs, and stomachs.

- **Hog bladders** — Are used primarily as casings for minced lunch meats since they are round in shape. They are sold in both a salted and dried form.

- **Small hog casings** — Consists of the small intestines, are used for stuffing products such as Polish sausage, smoked pork sausage, bratwurst, and many other coarse cut, small diameter sausage products. The casings are divided into three grades: narrow, medium, and wide.

- **Hog middles** — Includes three divisions: hog middle caps, cap-on hog middles, and cap-off hog middles. Hog middles are made from the blind gut or caecum of the hog and are used for stuffing frizzes, Italian sausages, and liver sausage.

- **Hog bungs** — Consists of the large intestine and are usually cut into 32 inch lengths then divided according to grade name. The grade names from the largest to the smallest are export, large prime, medium prime, special prime, small prime, and skip. Used for stuffing Genoa salami, liver sausage, and thuringer type sausages.

- **Hog stomachs** — Will hold between 5-8 lbs and are usually stuffed with headcheese.

Sheep Casings

Sheep casings, produced from the small intestines, are available in many sizes. They are among the most valuable of the animal casings because of the length, diameter, and thinness of the tissue. Sheep casings are used for frankfurters and pork sausages. Not only are sheep casings produced in the United States, but are also imported from foreign countries such as New Zealand, Eastern Europe, South America, and others.

Beef Casings

Weasand (esophagus), beef round (small intestine), beef middles (large intestine), beef bungs (caecum) and bladders are beef casings used in sausage production.

- **Beef weasand** — Are casings made from tubes leading from the throat to the rumen or first stomach. After removal from the animal, the weasand is inflated with air and dried. They are used as casings for bologna and salami.

- **Beef rounds** — Made from the small intestine, beef rounds are put in "sets" containing a minimum of 100 feet. They are used for stuffing ring bologna, holsteiner, and mettwurst.
- **Beef bungs** — Obtained from the caecum or appendix of cattle and are used for stuffing bologna and cappicola.
- **Beef bladders** — Used to stuff mortadella and various luncheon meat specialties and are sold in both dried and salted forms.

Manufactured Casings

The three classifications of manufactured casings are cellulose, collagen, and co-extruded casings. Synthetic casings have a greater structural strength than natural casings, but many are inedible.

- **Cellulose casings** — Consist of three types and are labelled as small cellulose, large cellulose, and fibrous casings. The small and large cellulose casings are made from cotton lint which is dissolved and regenerated into casings. The fibrous casings are the toughest since they are made from a special paper-pulp base which contains cellulose. These casings are inedible, provide strength, and display good permeability to moisture and smoke when the casings are moist.

  Small cellulose casings are used to produce skinless wieners and are available in either clear or tinted colors which impart a food-grade dye on the product's surface. Large cellulose casings, often colored, do not impart dye onto the product's surface and are used for stuffing bologna and braunschweiger.

  Fibrous casings have great structural strength and toughness that ensures uniformity from end to end. This type is commonly used for luncheon meat, summer sausage, and many other products.

- **Collagen casings** — Similar to natural casings since they are edible. These casings have the uniformity and toughness of a manufactured casing. They are made from the corium layer of split beef hides. The collagen is ground, swelled in acid, sieved, filtered, and extruded. Collagen casing has a lower structural strength than the cellulose casing.
- **Co-extruded casings** — Formed from a collagen paste which is co-extruded over the sausage batter during the stuffing process. These casings require very specialized equipment and a very large capital investment. This type of casing, rare in today's market, is used exclusively for high-volume operations.

JOB SHEETS 1 - 2

Development of:
READING SKILLS
MATHEMATICS SKILLS
SCIENCE SKILLS
EMPLOYABILITY SKILLS

- Introduce the assignment to the students by discussing why reading, mathematics, science, and employability skills are important.

- Discuss with them the following skills which are relevant to this task:

  READING SKILLS

  — Following written instructions

  MATHEMATICS SKILLS

  — Calculating with decimals

  — Using English and metric measures

  — Making measurements

  SCIENCE SKILLS

  — Using scientific instrument (thermometer; salinometer)

  EMPLOYABILITY SKILLS

  — Mastering specific job task/procedure

  — Developing good work habits/attitudes

- If students have difficulty following written instructions:

  — Discuss the possible consequences of not following instructions precisely.

  — Have them read the instructions several times, noting the key words and ideas.

- If students have difficulty calculating with decimals or making measurements:
  - Review basic skills for working with decimals.
  - Remind them that our money system is a decimal system.
  - Review units of measure in the English and metric systems.
  - Determine which system is used on the available instrument and demonstrate its use.
- If students have difficulty using the salinometer or thermometer, demonstrate the use of the instruments.
- If students have difficulty mastering a specific job task/procedure:
  - Emphasize the fact that practice makes a person proficient, and proficiency makes a person confident.
  - Suggest they study each component of the procedure to determine which area is causing difficulty.
  - Review the entire procedure.
  - Team them with proficient students to practice the procedure.
- If students have difficulty developing good work habits/attitudes:
  - Encourage them to become familiar with the entire procedure before they begin the work.
  - Discuss the role that good work habits and attitudes have in obtaining and retaining employment.
  - Discuss what behaviors and attitudes constitute good work habits.
  - Make sure the student knows what is expected of him or her.

JOB SHEET 1 — CURING, SMOKING, AND SAUSAGE MAKING — IX

OBJECTIVE 14

Read a salinometer.

INTRODUCTION

The importance of using a salinometer in curing cannot be overstated. An error in mixing a brine solution can result in the spoilage of several hundred pounds of meat. The use of a salinometer will prevent this economic loss from happening.

EQUIPMENT AND SUPPLIES

- Salinometer
- Curing solution of unknown strength provided by the instructor
- Thermometer

PROCEDURE

Functional Reading Skills
- Follow written instructions

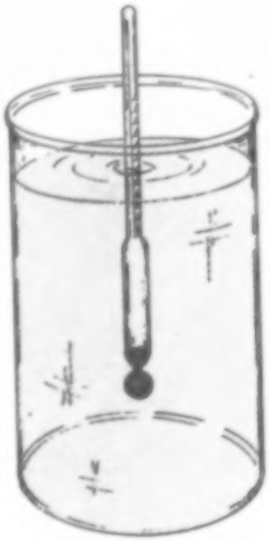
Operation and Calculation Skills
- Calculate with decimals

Math Application Skills
- Use English & metric measures

Functional Math Skills
- Make measurements

General Science Skills
- Use scientific instruments (thermometer; salinometer)

A salinometer determines the amount of curing ingredients dissolved in water. Pure water should register 0° and a solution which is completely saturated or in other words can hold no more salt should register 100°.



SALINOMETER

Job Acquisition/ Development Skills

- Master specific job/task procedure
- Develop good work habits/attitudes

1. Using the thermometer, determine the curing solution's temperature. Some salinometers are calibrated to test curing solution at 38°F., others at 60°. Any variation from this temperature will give an inaccurate reading. The reading must be adjusted by subtracting .116 of a degree of pickle for every degree below 60° and adding if it is above 60°.
2. After determining the temperature, remove the salinometer from its case and place it in the brine solution. The brine solution should be in a container which is at least eight inches deep. If the salinometer is bobbing, wait until it stops before taking a reading.
3. Read the degree of pickle from the scale on the stem of the salinometer. The point where the surface of the water meets the scale on the salinometer is where you determine the reading.
4. Recheck the temperature to ensure a correct salinometer reading and adjust for temperature differences by adding or subtracting .116 for each degree of temperature difference.
5. Ask your instructor to check your work.
6. Clean up work area and put away equipment.

OBJECTIVE 15

Prepare a brine solution.

INTRODUCTION

The curing of meat enables it to be stored without spoilage and provides a desirable flavor which consumers want. The higher the percentage of curing ingredients, the faster the curing process occurs. Nitrites are the actual curing ingredients, along with salt. Other ingredients are basically flavor enhancers.

EQUIPMENT AND SUPPLIES

- Noncorrosive container such as plastic, fiberglass, crock, or stainless steel
- Thermometer
- Salinometer
- 10 lbs. of salt
- 3 lbs. of sugar (Quart of syrup)
- ¼ oz. sodium nitrite
- 5 gallons of water

PROCEDURE

The strength of a brine solution is measured in degrees of pickle. A 100° pickle is a solution which holds the maximum amount of ingredients which can be dissolved at 40°F. A 0° pickle would be pure water. Most curing solutions rate about a 60-95° pickle. In this procedure, you will be mixing an 85° solution.

1. Place all of the ingredients in the water.
2. Stir the mixture until all of the ingredients have completely dissolved.
3. Check the temperature of the solution with the thermometer.
4. Check the degree of pickle with the salinometer.
5. Calculate the correct degree of pickle by adding or subtracting .116 degree for every degree of temperature above or below the calibrated temperature of the salinometer.
6. Ask your instructor to check your work.
7. Clean up work area and put away equipment.

Functional Reading Skills
- Follow written instructions

Operation and Calculation Skills
- Calculate with decimals

Math Application Skills
- Use English & metric measures

Functional Math Skills
- Make measurements

General Science Skills

- Use scientific instruments (thermometer; salinometer)

Physical Science Skills

- Investigate/apply chemical properties (elements, compounds, chemical symbols, families, formulae, equations)

Job Acquistion/ Development Skills

- Master specific job/task procedure
- Develop good work habits/attitudes

JOB SHEET 3

Development of:
READING SKILLS
MATHEMATICS SKILLS
SCIENCE SKILLS
EMPLOYABILITY SKILLS

- Introduce the assignment to the students by discussing why reading, mathematics, science, and employability skills are important.

- Discuss with them the following skills which are relevant to this task:

  READING SKILLS

  — Following written instructions

  MATHEMATICS SKILLS

  — Using English and metric measures

  — Making measurements

  SCIENCE SKILLS

  — Using scientific instruments (thermometer)

  EMPLOYABILITY SKILLS

  — Mastering specific job task/procedure

  — Developing good work habits/attitudes

- For additional suggestions on teaching basic skills, refer to Instructional Supplement 1.

OBJECTIVE 16

Prepare meat for smoking.

INTRODUCTION

Although salting and curing play the most significant role in preserving meat, smoking adds the flavor which the consumer desires when buying cured products. Most of the value added in the manufacturing process comes from the smoky flavor. Smoking is a process which must be done correctly and slowly if the desired results are to be accomplished.

EQUIPMENT AND SUPPLIES

- Meat to be smoked
- Smokehouse
- Smoking rack
- Probe thermometer
- Cold water
- Netting, if smoking cuts

PROCEDURE

Functional Reading Skills
- Follow written instructions

Math Application Skills
- Use English & metric measures

Functional Math Skills
- Make measurements

The smokehouse temperature and the time required depend upon the type of product and the desired degree of smoke flavor. Large hams require higher temperatures and longer smoking times than some of the smaller sausages. Your instructor will tell you the correct temperature and smoking period to use.

1. Prepare the product for smoking. For some recipes, whole cuts, such as hams, are rubbed with dry cure prior to netting. If smoking hams or chucks, the product should be placed in net bags and hung from a hook. All products to be smoked should have a "damp" surface when placed in the smoker. If the product is wet, the smoke will cling to the water and as the juice comes out of the meat and runs down the cut, it will leave a streaked appearance. If the cut is completely dry, the smoke will not cling to the surface, leaving an undesirable light color. The product should be wet down, allowed to air dry slightly, and then placed immediately in the smoker.

General Science Skills

- Use scientific instrument (probe thermometer)

Job Acquisition/ Development Skills

- Master specific job/task procedure
- Develop good work habits/attitudes

2. Place the product on a smoking rack. Whole cuts which have been netted are to be tied to a hook or placed directly on a rack. Sausages, especially link sausages, are to be looped over a wooden dowel which is placed on a rack. Do not allow the product to come in direct contact with metal. Metal acts as a conductor of heat and overcooks the portion of the product in contact with the metal.

3. Check to see if the temperature of the smoker is correct.

4. About twelve hours prior to the recommended time for the product to be finished, use the probe thermometer to check the internal temperature of the product. Although the recommended internal temperature varies according to what is being smoked, pork products usually require an internal temperature of at least 140° F (USDA requirements). This is to insure the destruction of any trichinae that is present. Other types of smoked meat and sausages are usually processed to a temperature of 125-128° F. Meats that are labeled, "Fully Cooked" must be processed to an internal temperature of 150° F.

5. When smoking sausages, immediately upon removal from the smoker, the sausage must be showered with cold water until the internal temperature is below 110° F. If sausages are not showered, the surface will have a wrinkled appearance.

6. After the product has cooled down, allow it to dry at room temperature long enough for a dark color to develop on the surface. The longer the drying period, the darker the color. This is called "blooming."

7. Package as desired and put in the cooler.

8. Ask your instructor to check your work.

9. Clean up work area and put away equipment.

JOB SHEET 4

Development of:
READING SKILLS
EMPLOYABILITY SKILLS

- Introduce the assignment to the students by discussing why reading and employability skills are important.
- Discuss with them the following skills which are relevant to this task:

  READING SKILLS

  — Following written instructions

  EMPLOYABILITY SKILLS

  — Mastering specific job task/procedure

  — Developing good work habits/attitudes

- For additional suggestions on teaching basic skills, refer to Instructional Supplement 1.

OBJECTIVE 17

Pump a ham.

INTRODUCTION

Three methods of pumping hams are used to cure hams: artery cure, pump pickling (stitch pumping), and mechanized pumping. In this job sheet, you will be using the arterial procedure for injecting hams. The arterial pumping of pickle into ham is the most efficient method of distributing the curing solution uniformly and quickly through the meat. Basically, the network of arteries present in the ham is used to distribute the curing solution to the entire ham.

EQUIPMENT AND SUPPLIES

- Ham
- Table
- Curing solution of unknown strength provided by the instructor
- Small needle attached to a hose and connected to a pump exerting 40-50 pounds of pressure or a hand injection syringe if a pump system is not available
- Surgical clamp
- Dry Mix

PROCEDURE

Functional Reading Skills
- Follow written instructions

Job Acquisition/ Development Skills
- Master specific job/task procedure
- Develop good work habits/attitudes

Since the salinity of the pickle to be used will depend upon how long and under what conditions the ham is to be stored, your instructor will probably prepare a pickle of 75° on the salinometer. This is assuming that the ham will be held under refrigeration of less than 40° F. The curing solution should be premixed before starting the procedure. It is very important that special care be taken when slaughtering to ensure no injury occurs to the femoral artery. If this artery is cut, then it is impossible to pump the ham in this manner and it must be stitch pumped.

1. Place the ham on the table with the butt side facing upward.
2. Remove the leaf fat, exposing the femoral artery which is located on the inside butt end of the ham. Leave a covering of fat on the artery to keep it moist and elastic. Do not mistake the vein, a smaller, darker, and brittle elastic runner, for the artery. This vein will not take pickle and will rupture if curing solution is injected.

3. Using the surgical clamp, clamp the artery as far back from the point where the artery branches as possible. If the artery has been cut immediately before or after the branch, then the two branches must be pumped separately.

4. Before injecting the solution into the artery, test the needle instrument to insure that the solution is flowing. This also allows you to get the feel of the pressure behind the needle. Point the needle into a trash bin to prevent ruining supplies or equipment used in the process.

5. Hold the femoral artery in one hand. Keeping the pump needle almost parallel to the artery, insert the needle into the artery with the other hand. Make sure you do not puncture the opposite side of the artery, since this could cause leakage or rupture. Insert the needle fully into the artery. Hold the femoral artery by resting your hand on the ham itself.

6. When the needle is inserted and you are sure you have a good seal, activate the needle by pressing the lever or trigger on the needle gun. If you are using a syringe, compress the plunger.

7. When curing solution starts to leak from the opening of the artery, withdraw the needle. Carefully place the needle instrument aside. If you are using a syringe, you must keep filling the syringe and injecting the ham until you get the same results. The amount of cure injected into the ham should equal about 10 percent of the weight of the ham.

8. Hand rub the ham with dry cure mixture and place it on a shelf for several days before being smoked.

9. Ask your instructor to check your work.

10. Clean up work area and put away equipment.

JOB SHEET 5

Development of:
READING SKILLS
MATHEMATICS SKILLS
SCIENCE SKILLS
EMPLOYABILITY SKILLS

- Introduce the assignment to the students by discussing why reading, mathematics, science, and employability skills are important.

- Discuss with them the following skills which are relevant to this task:

  READING SKILLS

  — Following written instructions

  MATHEMATICS SKILLS

  — Calculating with decimals

  — Using English and metric measures

  — Making measurements

  SCIENCE SKILLS

  — Using scientific instrument (thermometer)

  EMPLOYABILITY SKILLS

  — Mastering specific job task/procedure

  — Developing good work habits/attitudes

- For additional suggestions on teaching basic skills, refer to Instructional Supplement 1.

JOB SHEET 5 — CURING, SMOKING, AND SAUSAGE MAKING — IX

OBJECTIVE 18

Prepare sausage.

INTRODUCTION

There are many different kinds of sausages and as many different recipes for each. The recipe below is for a typical cooked salami. Other recipes can be used if preferred by the instructor.

EQUIPMENT AND SUPPLIES

- 65 lbs. lean beef trimmings
- 35 lbs. regular pork trimmings
- 2.5 lbs. salt
- 12 oz. corn syrup
- 7 oz. ground black pepper
- 4 oz. prepared cure mixture
- 2.5 oz. whole black pepper
- 2 oz. cardamon
- 2 oz. fresh garlic
- 3.5 lbs. soy protein concentrate
- 10 lbs. ice water
- Grinder with 1/8 inch plate and 3/16 inch plate
- 3-50 lb. mixing tubs
- Mixing vat
- Thermometer

PROCEDURE

Functional Reading Skills
- Follow written instructions

There are as many ways to produce sausage as there are kinds of sausage. This procedure is a popular method for producing salami. All meat should be chilled to at least 38° F. Since the revolving of the grinder heats the meat as it is ground, water must be added to keep the meat cool. If this is not done, the fat in the meat liquifies, giving the sausage a greasy appearance and creating "fat caps" at both ends of the sausage.

1. Grind beef through a 1/8 inch plate while adding ice water.
2. Grind pork through a 3/16 inch plate while adding ice water.
3. Place meat in mixing vat.
4. Premix all dry ingredients.
5. Add premixed and remaining ingredients to the meat and mix well.
6. Place the meat in tubs to chill over night
7. Ask your instructor to check your work.
8. Clean up work area and put away equipment.

Functional Math Skills

- Make measurements

General Science Skills

- Use scientific instruments (thermometer)

Job Acquisition/ Development Skills

- Master specific job/task procedure
- Develop good work habits/attitudes

JOB SHEET 6

Development of:
READING SKILLS
EMPLOYABILITY SKILLS

- Introduce the assignment to the students by discussing why reading and employability skills are important.

- Discuss with them the following skills which are relevant to this task:

  READING SKILLS

  — Following written instructions

  EMPLOYABILITY SKILLS

  — Mastering specific job task/procedure

  — Developing good work habits/attitudes

- For additional suggestions on teaching basic skills, refer to Instructional Supplement 1.

JOB SHEET 6

CURING, SMOKING, AND SAUSAGE MAKING

IX

OBJECTIVE 19

Fill sausage casings.

INTRODUCTION

Casings are what give sausages their characteristic shape and color. Natural casings are stuffed easily and are easier to twist when making link sausage. There are not enough animals slaughtered to make all the casings needed for the sausage sold in today's market. Approximately 85-90 percent of the sausages sold in any supermarket use artificial casings. These casings are usually made from the collagen layer of beef hides and are completely edible. The preparation of natural casings is slightly different from artificial ones. Your instructor will provide you with the casing and tell you the correct procedure to use.

EQUIPMENT AND SUPPLIES

- Prepared sausage mixture
- Stuffer
- Casings, either natural or collagen
- Twine
- Tub of water
- Casing perforator
- Sausage stuffing table

PROCEDURE

Functional Reading Skills
- Follow written instructions

If the salami sausage mixture prepared in Job Sheet 5 is to be stuffed, use either a 40 mm natural beef rounds casing or a three inch collagen or cellulose casing.

1. The night before sausage is to be stuffed using natural casings, the casings need to be flushed. Natural casings are packed in a bundle, called a "hank," in a salt water solution. Since a single casing may be as long as 13 feet, a hank needs to be laid out on a long table and unravelled. When the casings are unravelled and separated, cut them into 24-inch lengths. Flush them by putting one end under a faucet and filling 12-18 inches with water. Then run the water through to the other end. After flushing, make sure that all water and air is removed from the casing. Place the casing in a five gallon bucket of water with about four inches of the casing hanging out over the rim. When all of the casings have been flushed and placed in the bucket, place a cover

Job Acquisition/ Development Skills

- Master specific job/task procedure
- Develop good work habits/attitudes

over the bucket and store it in the cooler overnight. This ensures complete removal of the salt and makes the casing more tender.

If collagen casings are used, they should be soaked in water for an hour prior to stuffing.

2. Remove the chilled meat and casings from the cooler.
3. Take a casing and holding one end, submerge it in water allowing water into the casing. This lubricates the casing and makes it easier to place on the stuffer nozzle.
4. Thread one end of the casing onto the stuffer nozzle and work the entire casing onto the nozzle except for about three inches.
5. Place the sausage mixture into the stuffer packing the mixture carefully to remove any air pockets.
6. Keep one hand on the casing at the end of the nozzle to slow the passage of the casing thus allowing it to fill completely as you depress the plunger.
7. Any air pockets that occur on the outside of the sausage should be pricked with a needle to allow the air to escape. Air pockets will fill with grease as the sausage cooks creating a fatty appearance.
8. As the casing fills, keep the casing moving to the front of the nozzle to prevent it from breaking.
9. When the casing is filled to about three inches from the end, remove it from the nozzle and twist the excess casing tightly.
10. Using twine, tie a double half hitch around the twist. Then divide the excess casing into two parts and tie double half hitches around each.
11. Tie the other end of the sausage in the same manner.
12. Check the sausage again for air pockets and puncture any found.
13. Hang from the twine in the smoker.
14. Ask your instructor to check your work.
15. Clean up work area and put away equipment.

JOB SHEET 1

Read a salinometer.

Student's name ______________________ Date __________

Evaluator's name ______________________ Attempt no. ______

Instructions: When you are ready to perform this task ask your instructor to observe the procedure and complete this form. All items listed under "Process Evaluation" must receive a "Yes" for you to receive an overall performance evaluation.

PROCESS EVALUATION

Evaluator note: Write a check mark in the "Yes" or "No" blanks to designate whether or not the student has satisfactorily achieved each step in this procedure. If the student is unable to achieve this competency, have the student review the materials and try again.

The student:	Yes	No
1. Correctly determined the temperature.	____	____
2. Correctly adjusted for temperature, if necessary.	____	____
3. Correctly determined the degree of pickle.	____	____
4. Rechecked the temperature.	____	____
5. Cleaned work area and put away equipment.	____	____

EVALUATOR'S COMMENTS

____

____

____

PRODUCT EVALUATION

Evaluator note: Rate the student on the following criteria by circling the appropriate numbers. Each criterion must receive a rating of "3" or higher to demonstrate student mastery. (See Performance Evaluation Key.) A student who is unable to demonstrate mastery should review the material and submit another product for evaluation.

Criteria:				
Corrected for temperature	4	3	2	1
Changed solution temperature	4	3	2	1
Correct salinometer reading	4	3	2	1
Degree of pickle	4	3	2	1
Cleaned work area and put away equipment	4	3	2	1

EVALUATOR'S COMMENTS

____

____

____

AVERAGE RATING

Evaluator note: To obtain an average rating for the competency profile, total the designated points in "Product Evaluation" and divide by the total number of criteria. Circle the rating on the "Performance Evaluation Key" below.

PERFORMANCE EVALUATION KEY

4 **Skilled** - Can perform job with no additional training
3 **Moderately Skilled** - Has performed job during training program; limited additional training may be required
2 **Limited Skill** - Has performed job during training program; additional training is required to develop skill
1 **Unskilled** - Is familiar with process, but is unable to perform job

JOB SHEET 2

Prepare a brine solution.

Student's name ______________________ Date ____________

Evaluator's name ______________________ Attempt no. ______

Instructions: When you are ready to perform this task ask your instructor to observe the procedure and complete this form. All items listed under "Process Evaluation" must receive a "Yes" for you to receive an overall performance evaluation.

PROCESS EVALUATION

Evaluator note: Write a check mark in the "Yes" or "No" blanks to designate whether or not the student has satisfactorily achieved each step in this procedure. If the student is unable to achieve this competency, have the student review the materials and try again.

The student:	Yes	No
1. Mixed ingredients completely.	____	____
2. Correctly determined the temperature.	____	____
3. Correctly determined salinometer reading.	____	____
4. Correctly calculated the degree of pickle.	____	____
5. Cleaned work area and put away equipment.	____	____

EVALUATOR'S COMMENTS

____

____

____

PRODUCT EVALUATION

Evaluator note: Rate the student on the following criteria by circling the appropriate numbers. Each criterion must receive a rating of "3" or higher to demonstrate student mastery. (See Performance Evaluation Key.) A student who is unable to demonstrate mastery should review the material and submit another product for evaluation.

Criteria:				
Mixed completely	4	3	2	1
Correct temperature	4	3	2	1
Correct salinometer reading	4	3	2	1
Correct calculation of pickle	4	3	2	1
Cleaned work area and put away equipment	4	3	2	1

EVALUATOR'S COMMENTS

____

____

____

AVERAGE RATING

Evaluator note: To obtain an average rating for the competency profile, total the designated points in "Product Evaluation" and divide by the total number of criteria. Circle the rating on the "Performance Evaluation Key" below.

PERFORMANCE EVALUATION KEY

4 **Skilled** - Can perform job with no additional training
3 **Moderately Skilled** - Has performed job during training program; limited additional training may be required
2 **Limited Skill** - Has performed job during training program; additional training is required to develop skill
1 **Unskilled** - Is familiar with process, but is unable to perform job

PRACTICAL TEST 3

CURING, SMOKING, AND SAUSAGE MAKING

IX

JOB SHEET 3

Prepare meat for smoking.

Student's name ______________________ Date ____________

Evaluator's name ______________________ Attempt no. ______

Instructions: When you are ready to perform this task ask your instructor to observe the procedure and complete this form. All items listed under "Process Evaluation" must receive a "Yes" for you to receive an overall performance evaluation.

PROCESS EVALUATION

Evaluator note: Write a check mark in the "Yes" or "No" blanks to designate whether or not the student has satisfactorily achieved each step in this procedure. If the student is unable to achieve this competency, have the student review the materials and try again.

The student:	Yes	No
1. Correctly prepared product for smoking.	____	____
2. Loaded smoker properly.	____	____
3. Adjusted smoker temperature correctly.	____	____
4. Removed product from smoker at the correct time.	____	____
5. Properly cooled the product.	____	____
6. Bloomed the product correctly.	____	____
7. Cleaned work area and put away equipment.	____	____

EVALUATOR'S COMMENTS

____

____

____

PRODUCT EVALUATION

Evaluator note: Rate the student on the following criteria by circling the appropriate numbers. Each criterion must receive a rating of "3" or higher to demonstrate student mastery. (See Performance Evaluation Key.) A student who is unable to demonstrate mastery should review the material and submit another product for evaluation.

Criteria:				
Correctly prepared	4	3	2	1
Adjusted smoker	4	3	2	1
Loaded smoker	4	3	2	1
Removed product at the correct time	4	3	2	1
Cooled product correctly	4	3	2	1
Bloomed product correctly	4	3	2	1
Cleaned work area and put away equipment	4	3	2	1

EVALUATOR'S COMMENTS

AVERAGE RATING

Evaluator note: To obtain an average rating for the competency profile, total the designated points in "Product Evaluation" and divide by the total number of criteria. Circle the rating on the "Performance Evaluation Key" below.

PERFORMANCE EVALUATION KEY

4 **Skilled** - Can perform job with no additional training
3 **Moderately Skilled** - Has performed job during training program; limited additional training may be required
2 **Limited Skill** - Has performed job during training program; additional training is required to develop skill
1 **Unskilled** - Is familiar with process, but is unable to perform job

JOB SHEET 4

Pump a ham.

Student's name ______________________ Date ____________

Evaluator's name ______________________ Attempt no. ______

Instructions: When you are ready to perform this task ask your instructor to observe the procedure and complete this form. All items listed under "Process Evaluation" must receive a "Yes" for you to receive an overall performance evaluation.

PROCESS EVALUATION

Evaluator note: Write a check mark in the "Yes" or "No" blanks to designate whether or not the student has satisfactorily achieved each step in this procedure. If the student is unable to achieve this competency, have the student review the materials and try again.

The student:	Yes	No
1. Correctly prepared artery for pumping.	____	____
2. Clamped artery correctly.	____	____
3. Tested pump before inserting needle.	____	____
4. Inserted needle into artery correctly.	____	____
5. Activated pump correctly.	____	____
6. Injected the correct amount of solution.	____	____
7. Correctly rubbed ham.	____	____
8. Cleaned work area and put away equipment.	____	____

EVALUATOR'S COMMENTS

____

____

____

PRODUCT EVALUATION

Evaluator note: Rate the student on the following criteria by circling the appropriate numbers. Each criterion must receive a rating of "3" or higher to demonstrate student mastery. (See Performance Evaluation Key.) A student who is unable to demonstrate mastery should review the material and submit another product for evaluation.

Criteria:

Prepared artery	4	3	2	1
Inserted needle	4	3	2	1
Pumped ham	4	3	2	1
Correct amount	4	3	2	1
Rubbed ham	4	3	2	1
Cleaned work area and put away equipment	4	3	2	1

EVALUATOR'S COMMENTS

AVERAGE RATING

Evaluator note: To obtain an average rating for the competency profile, total the designated points in "Product Evaluation" and divide by the total number of criteria. Circle the rating on the "Performance Evaluation Key" below.

PERFORMANCE EVALUATION KEY

4 **Skilled** - Can perform job with no additional training
3 **Moderately Skilled** - Has performed job during training program; limited additional training may be required
2 **Limited Skill** - Has performed job during training program; additional training is required to develop skill
1 **Unskilled** - Is familiar with process, but is unable to perform job

PRACTICAL TEST 5

CURING, SMOKING, AND SAUSAGE MAKING

IX

JOB SHEET 5

Prepare sausage.

Student's name ______________________ Date __________

Evaluator's name ______________________ Attempt no. ______

Instructions: When you are ready to perform this task ask your instructor to observe the procedure and complete this form. All items listed under "Process Evaluation" must receive a "Yes" for you to receive an overall performance evaluation.

PROCESS EVALUATION

Evaluator note: Write a check mark in the "Yes" or "No" blanks to designate whether or not the student has satisfactorily achieved each step in this procedure. If the student is unable to achieve this competency, have the student review the materials and try again.

The student:	Yes	No
1. Correctly ground meat.	____	____
2. Kept the meat at the proper temperature while grinding.	____	____
3. Measured ingredients correctly.	____	____
4. Mixed spices well.	____	____
5. Mixed meat and spices well.	____	____
6. Cleaned work area and put away equipment.	____	____

EVALUATOR'S COMMENTS

____

____

____

PRODUCT EVALUATION

Evaluator note: Rate the student on the following criteria by circling the appropriate numbers. Each criterion must receive a rating of "3" or higher to demonstrate student mastery. (See Performance Evaluation Key.) A student who is unable to demonstrate mastery should review the material and submit another product for evaluation.

Criteria:				
Ground meat correctly	4	3	2	1
Correct meat temperature	4	3	2	1
Measured spices correctly	4	3	2	1
Mixed meat and spices well	4	3	2	1
Cleaned work area and put away equipment	4	3	2	1

EVALUATOR'S COMMENTS

____

____

____

AVERAGE RATING

Evaluator note: To obtain an average rating for the competency profile, total the designated points in "Product Evaluation" and divide by the total number of criteria. Circle the rating on the "Performance Evaluation Key" below.

PERFORMANCE EVALUATION KEY

4 **Skilled** - Can perform job with no additional training

3 **Moderately Skilled** - Has performed job during training program; limited additional training may be required

2 **Limited Skill** - Has performed job during training program; additional training is required to develop skill

1 **Unskilled** - Is familiar with process, but is unable to perform job

PRACTICAL TEST 6

CURING, SMOKING, AND SAUSAGE MAKING

IX

JOB SHEET 6

Fill sausage casings.

Student's name ______________________ Date ____________

Evaluator's name ______________________ Attempt no. ______

Instructions: When you are ready to perform this task ask your instructor to observe the procedure and complete this form. All items listed under "Process Evaluation" must receive a "Yes" for you to receive an overall performance evaluation.

PROCESS EVALUATION

Evaluator note: Write a check mark in the "Yes" or "No" blanks to designate whether or not the student has satisfactorily achieved each step in this procedure. If the student is unable to achieve this competency, have the student review the materials and try again.

The student:	Yes	No
1. Correctly prepared casings.	____	____
2. Placed casings on stuffer correctly.	____	____
3. Stuffed sausage tightly with no air spaces.	____	____
4. Left the correct excess at both ends of the sausage.	____	____
5. Tied both ends of the sausage correctly.	____	____
6. Removed all air pockets from the exterior.	____	____
7. Cleaned work area and put away equipment.	____	____

EVALUATOR'S COMMENTS

____

____

____

PRODUCT EVALUATION

Evaluator note: Rate the student on the following criteria by circling the appropriate numbers. Each criterion must receive a rating of "3" or higher to demonstrate student mastery. (See Performance Evaluation Key.) A student who is unable to demonstrate mastery should review the material and submit another product for evaluation.

Criteria:				
Prepared casings correctly	4	3	2	1
Stuffed casings tightly	4	3	2	1
Tied ends correctly	4	3	2	1
Removed all air pockets	4	3	2	1
Cleaned work area and put away equipment	4	3	2	1

EVALUATOR'S COMMENTS

____

____

____

AVERAGE RATING

Evaluator note: To obtain an average rating for the competency profile, total the designated points in "Product Evaluation" and divide by the total number of criteria. Circle the rating on the "Performance Evaluation Key" below.

PERFORMANCE EVALUATION KEY

4 **Skilled** - Can perform job with no additional training
3 **Moderately Skilled** - Has performed job during training program; limited additional training may be required
2 **Limited Skill** - Has performed job during training program; additional training is required to develop skill
1 **Unskilled** - Is familiar with process, but is unable to perform job

WRITTEN TEST

CURING, SMOKING, AND SAUSAGE MAKING

IX

Name ______________________________ Score__________

OBJECTIVE 1

Match terms associated with curing, smoking, and sausage making to their correct definitions. Write the correct letters in the blanks.

___ 1. Tested measurement of trace compounds given as parts per million of meat tested

___ 2. A device used for testing the strength of a pickling solution

___ 3. An inexpensive sweetener, derived from corn, which is used as a sweetener in some sausages

___ 4. The addition of ingredients to meat to aid in its preservation or the particular ingredients themselves

___ 5. The ability of the ingredients in a ground product to stick together

___ 6. Sugar extracted from sugar cane or beets which is used as a sweetener in some sausages

___ 7. Suspected carcinogen that is chemically formed during the cooking process from nitrates and nitrites present in cured meats.

___ 8. The changing of position of cuts during the immersion cure process to enable the curing solution to reach all parts of the meat

a. Cure

b. Salinometer

c. Fructose

d. Product bind

e. Sucrose

f. Phenolic fraction

g. Dextrose

h. Nitrosamines

i. Overhauling

j. PPB

k. PPM

May be photocopied for student use.

___ 9. The chemical compound present in wood smoke that gives smoked meat a smoky aroma and flavor

OBJECTIVE 2 **Discuss the history of curing, smoking, and sausage making.**

1. What was the first known method used to preserve meat?

2. What purpose did spices serve in sausages?

3. How did the climate affect the type of sausage preferred?

4. How much cured meat is eaten in the United States annually?

May be photocopied for student use.

OBJECTIVE 3 **Select from a list the characteristics that prompt consumer decisions to buy smoked and cured meat products.** Write an "X" in the blank before each correct answer.

___ 1. Color development

___ 2. Flavor development

___ 3. Manufacturer's cost

___ 4. Preservation

___ 5. Shelf life

___ 6. Ingredients

OBJECTIVE 4 **Choose the word or phrase to complete statements about meat curing ingredients.** Write the correct letter in the blanks.

_____ 1. Water is used for all of the following EXCEPT

a. fixing characteristic pink color
b. replaces water lost in cooking
c. increases weight and reduces cost
d. carries solid ingredients of the pickle

_____ 2. The ingredient that gives cured meat its characteristic "cured flavor" is

a. nitrite
b. salt
c. sugar
d. spices

_____ 3. The most important ingredient in the curing formula is

a. nitrite and nitrate
b. salt
c. ascorbate
d. water

_____ 4. Alkaline phosphates are added to

a. enhance flavor
b. enhance color
c. prevent botulism
d. increase moisture

May be photocopied for student use.

____ 5. Sodium erythorbate is added to

a. convert nitrates to nitrites
b. retain moisture
c. lighten color
d. reduce moisture content

____ 6. Pickle refers to

a. using sodium erythorbate in the curing process
b. ingredients used to assure moistness
c. the salt solution used in curing
d. fixative used to create the desired pink color

____ 7. Sodium nitrite

a. prevents botulism
b. lowers pH of the cure
c. aids in water retention
d. causes cancer

____ 8. Sugar is added for all of the following reasons EXCEPT

a. retains water
b. masks salt flavor
c. enhances pink color
d. lowers pH

OBJECTIVE 5 **Name the different methods of curing meat.**

____

____

____

____

____

May be photocopied for student use.

OBJECTIVE 6 **Discuss the procedure used in each of the different methods of curing meat.**

1. Why is the dry salt cure method seldom used today?

2. Which method is the best for individuals?

3. Which process is used exclusively by processors who want a mild-cured bacon?

4. When using the sweet pickle cure method, which type of cuts should be placed at the bottom of the pickling vat and why?

5. What types of material should pickling vats be constructed of?

6. What temperature range produces the best results in immersion curing?

7. What types of cuts require the injection of pickling solution to prevent spoilage?

May be photocopied fc student use.

OBJECTIVE 7 **Name different methods of introducing curing solutions.** Write three methods in the space below.

OBJECTIVE 8 **Discuss curing solutions.**

1. What is meant by the degree of pickle?

2. What is the relationship between the degree of pickle and the length of time required for a complete cure?

3. What happens to the meat if it is allowed to remain in the pickling solution too long and is over cured?

OBJECTIVE 9 **Discuss meat smoking procedures.**

1. What type of wood is by far the most popular in smoking?

2. What type of wood should be avoided for smoking meat?

May be photocopied for student use.

3. How much moisture should be present on the outside of cuts when they are placed in the smoker?

____

4. What temperature range produces the best results when smoking meat?

____

5. How long is the period of time that meat is smoked?

____

OBJECTIVE 10

Match different types of sausages to their characteristics and ingredients. Write the correct letters in the blanks.

Part I

____ 1. A hotly spiced, coarse-ground pork and beef sausage with ground red pepper as the major flavor ingredient, also known as kabanossi

____ 2. A more common name is wiener

____ 3. Highly spiced, hot Spanish sausage made from coarse cut pork that is about the size of a large frankfurter

____ 4. Made with pork, veal, and garlic and used as a sandwich spread

____ 5. Polish sausage; a coarse-ground beef and pork sausage with spices added, including garlic

____ 6. Made from fresh pork and contains spices such as black pepper, sage, salt, thyme, nutmeg, and ginger and is the most common sausage eaten in America

a. Casing loaf
b. Chorizos
c. Mutton
d. Pepperoni
e. Mozzarella
f. Kielbasa
g. Frankfurter
h. Fresh pork sausage
i. Porzla
j. Cervelat
k. Mettwurst
l. Mortadella

May be photocopied for student use.

___ 7. Type of bologna made from very finely chopped pork and beef with cubes of pork fat suspended in the emulsion and smoked briefly at a high temperature

___ 8. Another term sometimes interchanged with summer sausage and Thuringer; it is a mildly flavored semi-dry sausage that is softer in consistency than the Italian salamis

Part II

___ 1. A coarse-ground German style salami that consists of beef and pork, spiced with garlic

___ 2. Semi-dry, all beef product characterized by a very heavy smoke and a very acidic flavor

___ 3. Fermented semi-dry sausages made from pork, sometimes beef and veal are added. Also called Thuringers

___ 4. A coarse-ground beef, pork, and veal sausage that is smoked to a reddish-brown color and seasoned with garlic or onion and other spices. Also known also as schueblig

___ 5. Made mostly from pork, although beef and veal are sometimes added in small quantities; this term is used interchangeably with summer sausage; also sold fresh

___ 6. Second most popular sausage sold in America; is finely ground beef and/or pork that is mildly seasoned

a. Summer sausage
b. Vintage links
c. Beerwurst
d. Thuringer links
e. Lebanon bologna
f. Knackwurst
g. New England sausage
h. Bluntwurst
i. Bologna
j. Verona
k. Kimwurst
l. Smoked pork sausage

May be photocopied for student use.

___ 7. A coarse-ground beef and pork sausage, also called Polish sausage

___ 8. A type of bologna that is coarse-ground pork with pieces of ham or chopped beef interspersed in the emulsion, also called Berlinger sausage

Part III

___ 1. Popular canned wiener that is small and has a rather bland taste

___ 2. A veal and pork sausage with spices similar to a frankfurter

___ 3. Italian sausage made from coarse-ground pork that is seasoned with garlic and other spices

___ 4. Sausage made from coarse chopped pork and seasoned with whole black pepper

___ 5. Pork and veal sausage made without nitrite thus giving it a white color; also known as white hots; this sausage contains mace, ginger, nutmeg, and white pepper

___ 6. A mixture of pork and beef seasoned with garlic and caraway seeds; also known as "hunter's sausage"

___ 7. Includes proportions of four parts fine chopped lean pork and one or two parts diced pork fat that is seasoned with garlic and other spices

___ 8. Lean, cured pork that is highly seasoned; stuffed into hog middles

a. Sopressata

b. Bratwurst

c. Landjaegar

d. Vienna sausage

e. Salami

f. Headwurst

g. Bockwurst

h. Fijord

i. Hamburgwurst

j. Lyons sausage

k. Sangria

l. Frizzes

May be photocopied for student use.

OBJECTIVE 11 **Select spices according to their use in sausage making.** Write the correct letters in the blanks.

_____ 1. A white spice with a distinctive odor and extremely pungent taste used in many products and in most beef products is

a. cloves
b. onion
c. garlic
d. tumeric

_____ 2. A very expensive yellow-orange spice with a bitter taste used primarily for color is

a. paprika
b. mustard
c. mace
d. saffron

_____ 3. The spice that has a pungent clove-like odor and is used in bologna, pork sausage, frankfurters, hamburger, and other products is

a. cumin
b. cardamon seed
c. allspice
d. mace

_____ 4. The greenish spice used in making dry sausage such as mortadella and pepperoni is

a. anise seed
b. allspice
c. caraway seed
d. fennel seed

_____ 5. The most popular spice is

a. sage
b. black pepper
c. onion
d. garlic

_____ 6. All of the following are greenish-colored leaf spices EXCEPT

a. mace
b. basil
c. savory
d. oregano

May be photocopied for student use.

_____ 7. A mixture of various spices used to flavor some Spanish and Mexican sausages is

a. chili powder
b. mustard
c. tumeric
d. nutmeg

_____ 8. The spice with a distinctively strong, aromatic odor and somewhat bitter taste used in chorizos and other Mexican and Italian sausages is

a. chili powder
b. cumin
c. mace
d. red pepper

_____ 9. A gray to greenish-brown leaf spice with a fragrant, aromatic odor and a warm, quite pungent taste used in liver sausages, bockwurst, and other products is

a. sage
b. thyme
c. allspice
d. nutmeg

_____ 10. The spice that is NOT a seed is

a. nutmeg
b. coriander
c. cinnamon
d. mustard

OBJECTIVE 12

Choose the word or phrase to complete statements about nonmeat ingredients used in sausage making. Write the correct letters in the blanks.

_____ 1. Antioxidants are used to

a. retard rancidity
b. dissolve fats
c. increase moisture
d. inhibit mold

_____ 2. During the course of sausage making, water is added

a. first
b. as ice
c. to dissolve fats
d. to protect proteins

May be photocopied for student use.

____ 3. Mold inhibitors contain potassium sorbate and

- a. salt
- b. phosphates
- c. lactone
- d. propylparaben

____ 4. Ingredients such as soy protein, cereal flours, sodium caseinate, and non-fat dry milk are added to improve binding, texture, and flavor. These ingredients are

- a. antioxidants
- b. extenders
- c. nitrosoamines
- d. binders

____ 5. The ingredients that dissolve proteins, help to stabilize and protect flavor, and help meats attain a longer shelf life are

- a. sugars
- b. extenders
- c. GDLs
- d. phosphates

____ 6. Ascorbate and erythorbate inhibit the formation of nitrosoamines and

- a. reduce deterioration rate of color
- b. prolong curing reaction for full flavor
- c. prevent botulism
- d. dissolve proteins to bind fat

____ 7. Sugar performs all the following functions EXCEPT

- a. provides food for microbial fermentation
- b. increases browning
- c. produces lactic acid
- d. inhibits mold growth

____ 8. Salt makes the sausage ingredients bind together by

- a. activating the proteins
- b. improving emulsion
- c. inhibiting the formation of nitrosoamines
- d. preventing oxidation of fat

May be photocopied for student use.

____ 9. GDL is used to

a. bind water
b. bind proteins
c. speed curing
d. retain color

____ 10. The ingredient that insures that fat does not coalesce into large fat pockets is the

a. water
b. nitrite
c. extender
d. salt

OBJECTIVE 13

Choose the word or phrase that completes statements about different types of casings used in sausage making. Write the correct letters in the blanks.

____ 1. The advantage of manufactured casings is that they

a. are most digestible
b. are more flavorful
c. have greater structural strength
d. have a longer shelf life

____ 2. Hog bladders are used primarily for

a. Polish sausage
b. headcheese
c. frankfurters
d. minced lunch meats

____ 3. Cellulose casings are made of

a. cotton lint
b. wood fiber
c. split beef hides
d. split hog hides

____ 4. The casing used to stuff mortadella and other luncheon meat specialties is

a. beef bladders
b. beef rounds
c. hog stomachs
d. hog middles

May be photocopied for student use.

_____ 5. Beef weasand is a casing made from the

a. caecum
b. esophagus
c. bladder
d. large intestine

_____ 6. The casing used in frankfurters and pork sausages is

a. sheep
b. collagen
c. cellulose
d. beef rounds

_____ 7. The high-technology types of casing used for high-volume operations is

a. collagen
b. cellulose
c. extruded
d. co-extruded

_____ 8. The most valuable animal casing is

a. beef
b. hog
c. sheep
d. collagen

_____ 9. Casings made from the hog's large intestines are the

a. small casings
b. middles
c. bungs
d. weasands

_____ 10. All of the following contribute to the popularity of manufactured casings over animal casings EXCEPT

a. uniformity
b. price
c. versatility
d. flavor

NOTE: Objectives 14-19 are evaluated on job sheets/assignment sheets in this unit. If you have not completed these components, see your instructor.

May be photocopied for student use.

WRITTEN TEST ANSWERS

CURING, SMOKING, AND SAUSAGE MAKING

IX

OBJECTIVE 1

1. k
2. b
3. g
4. a
5. d
6. e
7. h
8. i
9. f

OBJECTIVE 2

1. Salting
2. Masked the flavor of slightly rancid meat
3. Warmer areas preferred dry sausages because of the longer period of preservation. Cooler climates preferred fresh and cooked sausages because they would last in the cooler climate.
4. 7 billion pounds

OBJECTIVE 3

1, 2, 4, 5

OBJECTIVE 4

1. a
2. a
3. b
4. d
5. a
6. c
7. a
8. c

OBJECTIVE 5

- Dry salt cure
- Dry sugar cure
- Box cure
- Hot salt cure
- Sweet pickle cure

OBJECTIVE 6

1. It leaves a heavy salt content and an objectionable, salty flavor
2. Dry sugar cure
3. Box curing
4. Hams on the bottom, shoulders next, bacon on top. Thicker cuts require longer curing times so they are placed in the bottom of the vat.
5. Noncorrosive materials such as plastic, fiberglass, crock or stainless steel
6. 35-40° F.
7. Ham

OBJECTIVE 7

Answer should include the following:

- Plunger-type syringe
- Pump pickler (stitch pump)
- Mechanized pumps

OBJECTIVE 8

1. The strength of pickling solution or the percentage of dissolved ingredients.
2. The higher the degree of pickle, the shorter the period of curing.
3. It becomes very salty.

OBJECTIVE 9

1. Hickory
2. Pine and other conifers
3. Should be slightly damp, neither completely wet or dry
4. 120-125° F.
5. Usually 12 hours to 3 days

OBJECTIVE 10

Part I		Part II		Part III	
1.	d	1.	c	1.	d
2.	g	2.	e	2.	g
3.	b	3.	a	3.	e
4.	k	4.	f	4.	a
5.	f	5.	d	5.	b
6.	h	6.	i	6.	c
7.	l	7.	l	7.	j
8.	j	8.	g	8.	l

OBJECTIVE 11

1.	c	6.	a
2.	d	7.	a
3.	c	8.	b
4.	a	9.	b
5.	b	10.	c

OBJECTIVE 12

1.	a	6.	a
2.	b	7.	d
3.	d	8.	a
4.	b	9.	c
5.	d	10.	d

OBJECTIVE 13

1.	c	6.	a
2.	d	7.	d
3.	a	8.	c
4.	a	9.	c
5.	b	10.	d

OBJECTIVE SHEET

PRICING AND MARKETING ASPECTS OF MEAT PRODUCTS

X

INTRODUCTION

The meat industry is made up of many different types of processors who fill their particular niche in the market. Most meat processing operations have very small profit margins from which they must pay their expenses before they make any profit. A processor who is unable to determine the correct selling price, which will cover expenses and still yield a profit, will not stay in business very long.

UNIT OBJECTIVE

After completing this unit, the student will be able to make the proper decisions about the pricing of meat products and evaluate the profitability of products bought. The student will demonstrate these competencies by completing the assignment sheets, job sheets, and written test with a minimum of 85 percent accuracy.

SPECIFIC OBJECTIVES

After completing this unit, the student will be able to

1. Match terms associated with pricing meat products to their correct definitions.
2. Discuss supply and demand and their effects on meat prices.
3. Discuss factors that influence meat prices at the retail and wholesale levels.
4. State current consumer trends.
5. Discuss basic advertising principles as they affect meat merchandising.
6. Choose the word or phrase to complete statements about cutting tests.
7. Calculate the return on investment for meat products.
8. Select from a list correct methods of displaying meats in retail cases.
9. Discuss techniques of wrapping retail meats.
10. List information contained on retail meat labeling.
11. Choose the word or phrase to complete statements about the shelf life of meat.

12. Compare self-service retailing methods to full-service retailing methods.

13. Compare boxed beef prices to carcass beef prices. (Assignment Sheet 1)

14. Plan a case display. (Assignment Sheet 2)

15. Perform a cutting test. (Job Sheet 1)

PRICING AND MARKETING ASPECTS OF MEAT PRODUCTS

PREPARATION

- Obtain materials to supplement unit.

  NOTE: See Suggested Resources.

- Review instructional outline for this unit. Modify time frames to suit class needs and plan activities for each class period.
- Study specific objectives to determine those you will cover in your presentation. Also decide which objectives should be taught to which students.
- Determine scope and sequence of objectives that you add. Design and develop support materials, including evaluation techniques, for additional objectives.
- Determine how you will schedule time for students to demonstrate competence in the required procedures.
- Make arrangements for guest speakers. Supply speakers with specific objectives and other appropriate sections of the unit.
- Make arrangements to have primal ribs, scales, and cutting equipment available for Job Sheet 1.
- Prepare classroom.
  - — Put up posters, charts, and other items relating to the pricing and marketing of meat products.
  - — Have articles, brochures, and other literature on the marketing and pricing of meat products available for students.

DELIVERY

Objective 1

- Review terms with students.

Objectives 2 and 3

- Have the students read articles in trade publications concerning future price predictions and provide them with examples of possible future events to trigger a discussion regarding the possible effects on meat prices.

- Have students collect articles that pertain to events affecting meat prices.

Objective 4

- Discuss with the class current trends of consumer preference and ask the students to identify any trends that they recognize.

- Collect and make available to the class articles about dietary and health information that might have a bearing on consumer eating habits.

Objective 5

- Ask the manager of a local meat market to discuss marketing with the class.

- Collect current meat advertisements and have the class evaluate their effectiveness.

Objective 6

- Have a meat packing manager/supervisor discuss cutting tests and their effectiveness.

- Make up some examples of cutting tests for each species that show the values of different animals and values of different types of fabrication.

- Ask the class to discuss the methods of fabrication and the types of animals that would yield the most value.

Objective 7

- Present sample problems for students to calculate.

Objective 8

- Take a field trip to a local supermarket and/or meat market to see the methods of display used in the meat department.

- Ask a local meat manager to discuss with the class the correct case display methods.

Objective 9

- Show students samples of retail meat wrapping.

- Have the class wrap meat.

Objective 10

- Collect and show the class sample meat labels for different products.

Objective 11

- Show students actual cuts of meat that have been wrapped for various lengths of time to demonstrate shelf life.
- Show students samples of processed meats that have a long shelf life.

Objective 12

- Take a field trip to both a self-service and a full-service meat department to allow students to observe the differences.

APPLICATION

Objective 13

- Use Assignment Sheet 1 to give students the opportunity to develop skills in comparing prices.

Objective 14

- Use Assignment Sheet 2 to give students the opportunity to develop skills in planning display cases.

Objective 15

- Use Job Sheet 1 to give students the opportunity to develop skills in performing cutting tests.

EVALUATION

Practical Test

- Explain to students that they will be asked to demonstrate procedures on the job sheets to complete the practical test.
- Describe the rating scale used on the practical test.
- Give practical test.
- Reteach and retest if necessary.

Written Test

- Explain to students that they will be asked to demonstrate on the written test actions listed in the specific objectives.

- Give written test.

  NOTE: The written test may be given in sections if desired.

- Evaluate students on assignment sheet activities if not previously done.
- Reteach and retest if necessary.
- Complete appropriate section of competency profiles.
- Review individual and group performance in order to evaluate teaching methods. Adjust scope, sequence, or instructional approaches for additional lessons as required.

SUGGESTED RESOURCES

- Fowler, Stewart H., Ph.D., *The Marketing of Livestock and Meat*, 2nd ed., The Interstate Printers and Publishers, Inc., Danville, Illinois, 1961.

UNIT REFERENCES

- Fowler, Stewart H., Ph.D., *The Marketing of Livestock and Meat*, 2nd ed., The Interstate Printers and Publishers, Inc., Danville, Illinois, 1961.

INFORMATION SHEET

PRICING AND MARKETING ASPECTS OF MEAT PRODUCTS

X

OBJECTIVE 1

Match terms associated with pricing meat products to their correct definitions.

- **By-product** — Portions of the animal that are not mainly composed of skeletal muscle (fat trimmings, bone, and offal)
- **Carcass weight** — The weight of the carcass after slaughter
- **Chilled carcass weight** — The weight of the carcass after chilling

  NOTE: This is usually less than hot carcass weight because of moisture lost during the chilling process.

- **Cutting yield** — That portion of the weight of the original unit (carcass, side, primal, etc.) that is a salable product after processing
- **Dressing percent** — The proportion of the live weight that makes up the carcass

  NOTE: Dressing percent = (carcass weight divided by the live weight) x 100.

- **Drop credit** — The value of the offal
- **Hot carcass weight** — Weight of the carcass immediately after slaughter while the carcass is still hot
- **Live weight** — The weight of the live animal at the time of purchase by the slaughterer
- **Margin** — That portion of the sales income above the purchase price

  NOTE: Margin is used to pay for operating costs, equipment purchases, and profit. It is usually expressed as a percentage of the selling price.

- **Mark up** — That portion of the wholesale cost that is added to produce the margin

  NOTE: Mark up differs from margin in that it is figured as a percentage of cost.

- **Offal** — Parts of the animal removed from the carcass during slaughter

  NOTE: Edible offal are the heart, tongue, liver, etc. Inedible offal are the hide, hooves, hair, and digestive tract contents.

- **Price** — Value expressed on a per unit basis (dollars per pound)
- **Shrinkage** — The loss of weight during processing
- **Slaughter cost** — The total cost of buying, transporting, slaughtering, chilling, and handling the offal; it does not include the purchase price of the animal
- **Value** — Refers to total cost (dollars per carcass)
- **Yield** — The portion of the original weight that remains after processing

OBJECTIVE 2 **Discuss supply and demand and their effects on meat prices.**

The law of supply and demand states that supply affects both the demand and price of a product. If a product is in short supply, the effective demand is increased and the price goes up. If there is an oversupply of a commodity, the price goes down. Price can also be affected by a drop in demand. If the demand drops, there is an oversupply and the price goes down.

This economic law is the most important factor affecting the price of meat products. When there is an oversupply of cattle and therefore an oversupply of meat, the retailer and wholesaler must lower prices to sell the supply available. Lower meat prices dictate lower selling prices for live cattle. When there is an undersupply of meat, the wholesaler must pay a higher price in order to buy the product and the retail price is correspondingly higher.

The demand for meat at the retail level can also effect prices at the wholesale and producer levels. If there is a consumer concern about the wholesomeness of meat products, the quantity of meat bought by the public will drop. Retailers, in order to move the product before it goes bad, must lower their retail price. Because of their oversupply, they will be less inclined to pay a high price for meat which will lower the wholesale price. This in turn will create a lower live price for cattle.

All areas of the meat industry can affect the prices of meat at the different levels of distribution. A proficient manager in the meat industry will be constantly aware of factors which affect the supply, the demand, and therefore the price of meat products. They take these factors into consideration when determining an acceptable price to pay for the meat products and the margin of profit that will benefit their operations.

OBJECTIVE 3 **Discuss factors that influence meat prices at the retail and wholesale levels.**

There are other factors besides the laws of supply and demand that can influence prices. Increases in the cost of doing business can also affect the price. When workers in the meat industry receive an increase in pay, this increases the cost of doing business and is reflected in the selling price the processor charges. Increases in the cost of equipment, packaging, transportation, and storage can all affect retail prices. Changes in government regulations that require investment in new equipment or reduce the efficiency of the operation can also be reflected in increased prices.

All of these factors are important in determining the cost of meat to retailers and wholesalers, but the greatest variation in meat pricing occurs simply because of cyclical variations in cattle prices due to supply fluctuations.

OBJECTIVE 4 **State current consumer trends.**

The consumer is the ultimate regulator in the pricing of meat. Health attitudes, consumer preference, convenience of preparation, and price differences among products all influence consumer buying patterns. At the turn of the century, the most expensive portion of a pork carcass was the lard used for cooking. With the development of vegetable oils, lard is no longer preferred and the price has dropped to the point where today it is the least expensive part of the carcass.

Some of the trends affecting consumer meat-buying are:

- Health recommendations against eating high cholesterol foods.
- Increased demand for time-saving packaging and precooked products.
- Lower poultry prices due to mechanization of the industry.

All these changes in consumer preferences are reflected in their choices and consumption of meat products. It is important to note that these changes in preference are not necessarily scientifically sound, but rather are based on consumer perceptions of nutrition, health, and convenience. As the consuming public's beliefs about meat are changed by the media and scientific investigation, the consumption of different meat products will vary as a reflection of this change.

OBJECTIVE 5 **Discuss basic advertising principles as they affect meat merchandising.**

The marketing of meat products would be a lot more difficult if there was no such thing as advertising. A lot of time would be spent telling prospects and customers about what products are available.

Advertising can make the jobs of everyone in meat merchandising easier. If the right product and services are advertised at the right time, in the right way, to the right people, with the right technique, sales increase. It is important for all involved in meat sales to have a good understanding of advertising and its role in the selling process.

The role of advertising is to convey an accurate message to the consumer. Advertising can be aimed at selling products or services or producing goodwill for the company.

The three main functions of an advertisement are:

- To attract the attention of the customer.
- To inform the customer about your product, service, company, or idea.
- To convince the customer to purchase your product or service or have a good feeling toward your company.

The types of merchandise advertised can affect meat merchandising. The best merchandise to advertise includes:

- Best sellers
- Traffic builders — items that are in constant demand
- New items and services — fresh fish, smoked turkeys, deli's, etc.
- Nationally advertised items
- Reduced or promotional items

- Timely products — turkeys at Thanksgiving, hams at Christmas, etc.

Timing is a very important factor to consider when advertising. The appropriate times for advertising meat products include:

- Heavy promotional periods — grand openings, anniversary sales, holidays, and special events such as Christmas, July 4th, "Krazy Days," and rodeo days.

- The day of the week that is best for your store, products and customers — Wednesday or Thursday advertising is good for weekend grocery shopping. Advertising in the Sunday paper is recommended because people generally have more time to read the paper on the weekend.

Some factors to consider when selecting advertising media are the:

- Market coverage of the media

- Audience the media appeals to

- Types of business advertising the medium is best suited for

- Advantages and disadvantages of the medium

  NOTE: Sales representatives should be aware of when ads run so sales displays and demonstrations can be coordinated with the ads.

OBJECTIVE 6

Choose the word or phrase to complete statements about cutting tests.

The purpose of cutting tests in meat processing operations is to provide actual information under working conditions that will aid in making management decisions. A report form is used to record data gathered about the relative weights and percentages of cuts within the primal. The data gathered is used to compare different sources of supply, processing procedures, product mix, worker efficiency, and volume effects. Yield differences from different types of animals, the various types of cuts possible, and price fluctuations at every level of the meat industry make testing on a regular basis essential in determining maximum profitability. Tests are extremely important when changes in procedures, equipment, personnel, or prices are made. Different forms are used for each species. Each portion of the industry will use different parts of the test.

The cutting test consists of information about the carcass such as breed, live weight, sex, maturity score, quality grade, yield grade, external fat thickness, etc. After the carcass information has been obtained, information about the wholesale cuts are calculated, such as the weight, percent of side, price, and value. Next, retail cuts are analyzed as to weight, percentage of wholesale cut, price, and value. Finally, a summary of the sales value, marketing loss, and margin calculation is made.

OBJECTIVE 7

Calculate the return on investment for meat products.

The return on investment is a measurement of profit expressed as a percentage of money invested in the operation. This is an important measurement in determining profitability. To figure return on investment on either a monthly or yearly basis, calculate the profit made after purchases, operating costs, interest, labor, taxes, and repairs have been subtracted from sales. This figure is the net profit. Next, divide the net profit by the investment and multiply by 100. The result is the percentage of return on investment.

Return on investment = (Net profit ÷ Investment) X 100

OBJECTIVE 8

Select from a list correct methods of displaying meats in retail cases.

Meat cuts should be displayed in cases in a way that allows maximum visibility of all cuts to the customer. Meats should be divided by species and by roast, steak, etc. Each individual cut should be placed in rows running from front to rear of the case. Do not display different types of cuts in the same row (behind each other). This only confuses the customer and makes finding the desired product more difficult. Cases should be checked 4-5 times a day and as new items are added they should be placed at the back of the row and the older stock moved to the front. This increases the probability that the older stock will be purchased first. Any sale items should be prominently displayed to help the customer find the product.

A full range of cuts from each species should be marketed to satisfy the requirements of all customers. Any product that remains unsold should be checked to determine why. Some of the typical reasons for meat not selling are: it was improperly trimmed, improperly packaged, or had some color variation. If an over supply of a particular cut develops and the cut is nearing the end of its shelf life, the price must be reduced to move the product. Consideration should also be given to the reasons for over production of this particular cut.

In many cases, because of the volume of business, beef is the most prominently displayed species in the meat market. Chicken is the next most prominently displayed species.

Retail managers who pay attention to the display of the product and insure a clean, fresh-smelling sales area will greatly increase the volume of business.

OBJECTIVE 9 **Discuss techniques of wrapping retail meats.**

Most consumers prefer wrapping that is transparent so the meat can be examined as to quality and freshness. Most retail meats sold today are wrapped in a transparent plastic which is permeable to air. Oxygen is important in transforming the color of newly cut meat to the bright red preferred by the customer. This plastic wrap is also self-sealing and prevents blood and liquid spills in the shopping bag.

Most retail meat cuts are also packaged in styrofoam trays which act to brace the product, make it more attractive, and easier to handle. A layer of absorbent paper, with a plastic liner to prevent sticking to the meat, is used under the cut of meat to absorb any liquid which may leak after packaging.

OBJECTIVE 10 **List information contained on retail meat labeling.**

Product information labels have changed markedly in recent years. The development of laser bar code readers has greatly improved the efficiency of stock control methods and pricing uniformity. The use of bar codes to transmit product information and price to the register produces a more detailed sales tape for the consumer and eliminates "keying" errors by the employees.

The most basic information included on labels includes

- **unit price**
- **total price**
- **cut name**
- **weight**
- **package date**

Most meat retailers today use machines that automatically weigh, calculate price, print labels, and wrap in one operation. Some machines even add recommended cooking methods for the particular cut on the label. The unit price, usually given in dollars per pound, helps the consumer compare prices among different cuts.

OBJECTIVE 11 **Choose the word or phrase to complete statements about the shelf life of meat.**

The shelf life of different meat products varies greatly according to whether it is fresh or smoked, type of cut, and packaging material. Most fresh red meat cuts in stores have only a three day shelf life. This does not mean that the meat is no longer good on the fourth day, but because of discoloration and consumer preference for brightly colored meat, most stores will display meat only three days. Chickens, because of their color, are not affected by color variation. They are also usually wrapped in a non-permeable wrapping which prevents spoilage. Most stores will stock chickens as long as twelve to thirteen days. Smoked meat cuts, because of the preservatives added, can be displayed as long as twenty-one days without deterioration. Prepackaged specialty meats usually have a shelf life of two to three weeks. The shortest shelf life of any cut is that of ground beef. Most stores allow only one day for ground beef, then it must be sold.

Retailers usually lower the price of cuts nearing the end of their shelf life. Discounts can reach as much as 50 percent depending on how long past the shelf life the meat has been displayed. Some cuts can be recycled. For example, beef roast can be cut into steaks and the new cut surfaces will have a bright color. Some retailers will also regrind hamburger meat, giving it a brighter color. This practice can result in selling bad meat and is not recommended. Steaks and ribs can be boned and ground. Smoked meats can be refaced or the exposed meat cut away, repackaged, and sold.

If the meat market is to retain the customer's confidence in the product, the best method of moving older cuts is to reduce the price and sell them quickly. Most customers prefer a retailer who sells fresh products. Any attempt to mislead the public can only result in a loss of customers.

OBJECTIVE 12 **Compare self-service retailing methods to full-service methods.**

Most meat retailers today use a self-service method of retailing. The customers are presented with all the cuts available for sale and are able to make their own decisions as to what they will buy. Very little custom cutting is done for the customer. This method is attractive because only a few employees are needed to handle a large volume of sales.

In the old style meat markets, popular forty years ago, the customer was served by a employee who custom cut whatever was desired. This method is labor intensive, but is more attractive to some customers because they can buy exactly what they want. For example, steaks, roasts, and chops are cut individually to the specifications of the customer. A few upscale meat markets are doing quite well using a full-service operation to serve wealthier customers who are willing to pay a premium for full-service.

ASSIGNMENT SHEET 1

Development of:
WRITING SKILLS
MATHEMATICS SKILLS
CREATIVE THINKING AND PROBLEM SOLVING SKILLS
EMPLOYABILITY SKILLS
SOCIAL STUDIES SKILLS

- Introduce the assignment to the students by discussing why writing, mathematics, creative thinking and problem solving, employability, and social studies skills are important.

- Discuss with them the following skills which are relevant to this task:

  WRITING SKILLS

  — Using standard grammar, correct spelling, punctuation, and capitalization

  — Stating ideas clearly

  — Using complete sentences

  MATHEMATICS SKILLS

  — Calculating with whole numbers

  — Calculating with decimals

  CREATIVE THINKING AND PROBLEM SOLVING SKILLS

  — Analyzing/synthesizing information

  — Drawing conclusions

  — Applying creative/intuitive thinking processes

  EMPLOYABILITY SKILLS

  — Mastering specific job task/procedure

  — Developing good work habits/attitudes

SOCIAL STUDIES SKILLS

- Selecting/using sources of information
- Analyzing consumer issues

- If students have difficulty using good language skills, review use of complete sentences, rules of grammar, spelling, punctuation, and capitalization.
- If students have difficulty stating ideas clearly, review rules of good composition, particularly topic sentences and introductory paragraphs.
- If students have difficulty calculating with whole numbers and decimals:
  - Review basic addition, subtraction, multiplication, and division.
  - Review basic skills for working with decimals.
  - Remind them that our money system is a decimal system.
- If students have difficulty analyzing/synthesizing information, drawing conclusions, or applying creative/intuitive thinking processes:
  - Discuss the fact that analyzing means breaking the information down into all its components for examination.
  - Discuss the fact that synthesizing means to reassemble the information in a way that makes the information clear and usable to the student.
  - Urge the student to organize their thoughts and repeat them to you.
- If students have difficulty mastering a specific job task/procedure:
  - Emphasize the fact that practice makes a person proficient, and proficiency makes a person confident.
  - Suggest they study each component of the procedure to determine which area is causing difficulty.
  - Review the entire procedure.
  - Team them with proficient students to practice the procedure.

- If students have difficulty developing good work habits/attitudes:
  - Encourage them to become familiar with the entire procedure before they begin the work.
  - Discuss the role that good work habits/attitudes have in obtaining and retaining employment.
  - Discuss what behaviors and attitudes constitute good work habits.
  - Make sure the student knows what is expected of him or her.
- If students have difficulty selecting/using sources of information:
  - Provide a list of standard resources in your area.
  - Review basic procedures for selecting reference material.
  - Use in-class examples of footnotes and references available at the library.
- If students have difficulty analyzing consumer issues:
  - Select a topic they can personally identify with. Divide the class into two groups. Have one group present the pro side of the issue and the other group present the con side.
  - Present an issue that is receiving media attention and point out the statements made by others about the issue.
  - Discuss criteria for making the analysis.
  - Define consumer issues and provide current and historical examples.

ASSIGNMENT SHEET 1

PRICING AND MARKETING ASPECTS OF MEAT PRODUCTS

X

Name ______________________ Score __________

OBJECTIVE 13 **Compare boxed beef prices to carcass beef prices**

INTRODUCTION

The purpose of this assignment sheet is to compare the current prices for both types of wholesale products. The volume of sales for whole carcasses is decreasing each year but this is still a useful activity for you to research and compare the prices of both types of wholesale products.

DIRECTIONS

Read the directions, obtain the required information, and answer the questions.

Language Skills

- Use standard grammar, correct spelling, punctuation, and capitalization
- State ideas clearly

Composition Skills

- Use complete sentences

Obtain the current market prices of the items listed below. Your local meat market, supermarket, or slaughter house would be good places to find the information. Your instructor will recommend other sources of current market prices. Some packing publications list current prices. Your instructor will provide you with average weights of the primals listed below.

Item	Price/lb.	Weight	Total (Price x Weight)
Carcass half	______	______	______
Primal round	______	______	______
Primal loin	______	______	______
Primal rib	______	______	______
Primal chuck	______	______	______
Primal brisket	______	______	______
Foreshank	______	______	______
Full plate	______	______	______
Flank	______	______	______
Fat trim and bone	______	______	______

After completing the chart, determine the total cost for each primal and the total carcass half price, then answer the following questions.

1. Calculate the total carcass half price by adding the total costs of all the boxed primals. Show your work below. Which is least expensive?

2. What other costs must be added to the cost of the carcass half that are not added to the boxed price? List any handling or storage disadvantages which must be considered?

3. If the carcass half was exactly the same price as the boxed beef, what other factors should be considered in deciding which to buy?

4. Discuss buying habits of customers that might influence your decision on whether to buy boxed primals or carcass beef.

Operation and Calculation Skills
- Calculate with whole numbers
- Calculate with decimals

Cognitive Activities Skills
- Analyze/synthesize information
- Draw conclusions
- Apply intuitive thinking techniques

Job Acquisition/ Development Skills
- Master specific job task/procedure
- Develop good work habits/attitudes

Functional Social Studies Skills
- Select/use sources of information on current events
- Analyze consumer issues

5. Write a short summary of reasons for the increase in popularity of boxed beef.

ASSIGNMENT SHEET 2

Development of:
WRITING SKILLS
CREATIVE THINKING AND PROBLEM SOLVING SKILLS
EMPLOYABILITY SKILLS

- Introduce the assignment to the students by discussing why writing, creative thinking and problem solving, and employability skills are important.

- Discuss with them the following skills which are relevant to this task:

  WRITING SKILLS

  — Constructing graphics and symbols

  CREATIVE THINKING AND PROBLEM SOLVING

  — Analyzing/synthesizing information

  — Drawing conclusions

  — Applying creative/intuitive thinking processes

  EMPLOYABILITY SKILLS

  — Mastering specific job task/procedure

  — Developing good work habits/attitudes

- If students have difficulty constructing graphics and symbols:

  — Examine the needed structure for the graphics

  — Review the meaning of any symbols to be used

  — Explain that graphics and symbols are visual representations of factual information

- For additional suggestions on teaching basic skills, refer to Instructional Supplement 1.

ASSIGNMENT SHEET 2

PRICING AND MARKETING ASPECTS OF MEAT PRODUCTS

X

Name ______________________ Score __________

OBJECTIVE 14

Plan a case display.

INTRODUCTION

Good displays are the result of good planning. The benefits of attractive and effective displays are worth the effort: markets not only enhance sales, but also their image in the eyes of the customer.

The skill in planning an attractive and effective case display is important in maximizing sales. Attention to making the display convenient and attractive will result in higher sales volume.

In this assignment you will plan the case displays for beef, pork, lamb, and chicken.

DIRECTIONS

Composition Skills
- Construct graphics & symbols (non-numerical)

Cognitive Activities Skills
- Analyze/synthesize information
- Draw conclusions
- Apply intuitive thinking techniques

Job Acquisition/ Development Skills
- Master specific job task/procedure
- Develop good work habits/attitudes

Assume you are the meat manager for a large supermarket and you have been asked to plan the case displays for a new store.

Read through the two lists of cuts to be displayed before starting your diagrams.

Use the case diagram(s) on page 29 for the beef cuts. And use the case diagram(s) on pages 31 and 32 for the pork, lamb, and chicken layouts.

Follow the rules of proper layout found in objective 8.

NOTE: Each cut is assigned a number and an "X" for the multiple of the normal volume that each requires. For example, ground beef is sold at three times the rate of arm steak so it has a "3X" listed and the arm steak has a "1X." Small volumes are assigned a "½X" to show small amounts sold.

Also, allow extra room in diagrams for unusually large items, such as briskets.

Part I

Use the following beef cuts to set up the case on page 29. Write the cut number in each space.

BEEF

1. Arm roast bnls 1X
2. Cross rib roast ½X
3. Soup bone ½X
4. Arm steak 1X
5. Short ribs 1X
6. Chuck roast 2X
7. Chuck steak 2X
8. Seven bone roast 1X
9. Chuck eye steak 1X
10. Shank cross cuts ½X
11. Briskets 2X
12. Corned briskets 1X
13. Large end rib roast 1X
14. Small end rib roast 1X
15. Small end steak bnls 2X
16. Rib eye steak 1X
17. Rib eye roast ½x
18. Spare ribs 1X
19. Skirt steak bnls 1X
20. Flank steak ½X
21. Round steak 3X
22. Rump roast 2X
23. Rump roast bnls 1X
24. Heel of the round roast ½X
25. Stew meat 1X
26. Top round steak 1X
27. Cubed steak 2X
28. Bottom round roast 1X
29. Eye steak 1X
30. Tip roast 1X
31. Tip steak 1X
32. Kabobs 1X
33. Top loin steak bnls 2X
34. Sirloin steak 1X
35. Sirloin steak bnls 1X
36. Tenderloin steak ½X
37. T-bone steak 1X
38. Porterhouse steak 1X
39. Liver ½X
40. Kidneys 1X

Using the cuts from the previous page set up this case by writing in the cut number in each space.

Use the following cuts of pork, lamb and chicken to set up the case on page 31. Write the cut number in each space.

Part II

Pork

1. Blade Boston roast 1X
2. Arm roast 1X
3. Arm steak 1X
4. Blade steak 1X
5. Loin roast ½X
6. Pork chops 3X
7. Rib roast 1X
8. Loin blade roast 1X
9. Country-style ribs 1X
10. Butterfly chop 1X
11. Sirloin roast ½X
12. Spare ribs 1X
13. Smoked picnic 1X
14. Smoked picnic bnls 1X
15. Smoked jowl ½X
16. Salt pork ½X
17. Pigs feet ½X
18. Sliced bacon 4X
19. Smoked ham, whole 3X
20. Smoked ham, shank half 2X
21. Smoked ham, rump half 2X
22. Smoked ham, center slice 1X

Lamb

23. Shoulder roast bnls ½X
24. Riblets ½X
25. Lamb chops 1X
26. Crown roast ½X
27. Double chops ½X
28. Sirloin roast ½X
29. American-style leg 1X

Chicken

30. Whole fryers 4X
31. Cut-up fryers 3X
32. 3 halves cut up 2X
33. Breasts 2X
34. Legs and thighs 2X
35. Gizzards 1X
36. Livers 1X
37. Breasts bnls 1X
38. Breast strips 1X
39. Turkeys, whole 4X
40. Turkey breasts 1X
41. Turkey drumsticks 1X
42. Cornish hens 1X

Using the cuts from the previous page set up this case by writing in the cut number in each space.

ASSIGNMENT ANSWERS — PRICING AND MARKETING ASPECTS OF MEAT PRODUCTS — X

ASSIGNMENT SHEET 1

Instructor: Help your students get a good, up-to-date set of prices from which good comparisons can be made. Check each student's answers for correct correlation of the data.

1. Answer calculated by the instructor.

2. Fabrication costs
   Packaging costs
   Increased shrinkage
   Heavier and more equipment to move carcass
   Loss of unsold cuts from carcass
   Higher labor costs
   Larger cooler to handle carcasses
   More difficult to move and package

3. Greater flexibility in buying exactly what is needed is the most important advantage of boxed beef.

4. Students should discuss the buying habits of different stores and how boxed beef enables the store to buy exactly what is wanted by the customer with no loss.

5. Evaluation criteria should include information covered in class as well as that found in the assignment sheet.

ASSIGNMENT SHEET 2

The following are suggested criteria for evaluation:

- Correctly placed meat of the same types of animals together.
- Placed similar cuts together, ie kept steaks, roasts, etc. together.
- Provided enough space for each cut according to its sales volume.
- All cuts side by side with no different cuts behind one another.

JOB SHEET 1

Development of:
READING SKILLS
MATHEMATICS SKILLS
SCIENCE SKILLS
EMPLOYABILITY SKILLS

- Introduce the assignment to the students by discussing why reading, mathematics, science, and employability skills are important.

- Discuss with them the following skills which are relevant to this task:

  READING SKILLS

  — Following written instructions

  MATHEMATICS SKILLS

  — Calculating with whole numbers

  — Calculating with decimals

  — Solving percent problems

  — Making measurements

  — Solving practical problems

  SCIENCE SKILLS

  — Using scientific instrument (direct reading scales)

  EMPLOYABILITY SKILLS

  — Mastering specific job task/procedure

  — Developing good work habits/attitudes

- If students have difficulty making measurements:

  — Suggest that they look at a yardstick or tape that is marked in both English and metric and study the measurements until there is a concrete idea about the lengths of different units of measurement.

  - Review units of measure in the English and metric systems.

- If students have difficulty using direct reading scales, demonstrate the use of the instrument.

JOB SHEET 1 — PRICING AND MARKETING ASPECTS OF MEAT PRODUCTS — X

OBJECTIVE 15

Perform a cutting test.

INTRODUCTION

Cutting tests are used to determine the most profitable method of fabrication and to identify procedures that reduce waste. Comparisons of profitability of different types of animals or wholesale dealers are just some of the situations that make cutting tests a useful management tool. Cutting tests can be made on any type of operation and any individual step in the fabrication process. In the cutting test you will perform, a beef rib will be tested.

EQUIPMENT AND SUPPLIES

- Band saw
- Boning knife
- Primal rib
- Direct reading scales

PROCEDURE

1. Weigh the rib and record the relevant information such as weight, source, wholesale cost, wholesale price, and expected retail value. The expected retail value is obtained by multiplying the cost by the margin. This gives you an expected average value that the cut should cut out.

   EXAMPLE:

   $87.50 (wholesale cost) x 1.2 (the expected margin)
   = $105.00 (expected retail value)

2. After recording this information, fabricate the primal according to your instructors specifications. The same type of rib will be fabricated by your classmates in different ways so that the method that yields the highest return can be identified. After the rib is fabricated, weigh the cuts derived and record this information. Fat and bone trim should be kept separate and weighed.

3. After all cuts have been weighed and recorded, make the final calculations. Your instructor will provide you with current market retail prices for the cuts and this information should be recorded. Using these prices and the weights of each cut, a retail value of each cut can be calculated and recorded. Next, compute the actual retail cost by adding the

Functional Reading Skills
- Follow written instructions

Operation and Calculation Skills
- Calculate with whole numbers
- Calculate with decimals

Math Application Skills
- Solve percent problems

Functional Math Skills
- Make measurements
- Solve practical

General Science Skills

- Use scientific instrument (direct reading scales)

Job Acquisition/ Development Skills

- Master specific job task/procedure
- Develop good work habits/attitudes

retail prices of all cuts fabricated. After actual retail cost has been figured, calculate the actual margin by subtracting wholesale cost from actual retail cost. These calculations help you compare different fabrication methods and determine the most profitable methods of operation.

4. After all groups have completed their cutting tests, results should be compared to determine the most profitable method of fabrication.

5. Clean work area and put away tools and equipment.

RETAIL CUTTING TEST FOR BEEF RIBS

Cut by ________ Date ____________

Item ___________ Source __________

No. of item ______ Weight __________

Wholesale price ____________

Expected retail value (20% margin) ______

	Weight	Percent of Wholesale Cut	Retail Price	Value
Rib (wholesale)				
Short standing rib roast				
Rib steaks				
Small end				
Large end				
Boneless				
Rib-eye steaks				
Back ribs				
Short ribs				
Lean				
Fat				
Bone				
Totals				

Actual retail value ______________

Wholesale cost ______________

Margin ______________

Margin as percent of sales ______________

Romans, Jones, Costello, Carlson and Ziegler, *The Meat We Eat*, Interstate Publishers, Inc. 1985. Used by permission.

PRICING AND MARKETING ASPECTS OF MEAT PRODUCTS

JOB SHEET 1

Perform a cutting test.

Student's name ______________________ Date ____________

Evaluator's name ______________________ Attempt no. ______

Instructions: When you are ready to perform this task ask your instructor to observe the procedure and complete this form. All items listed under "Process Evaluation" must receive a "Yes" for you to receive an overall performance evaluation.

PROCESS EVALUATION

Evaluator note: Write a check mark in the "Yes" or "No" blanks to designate whether or not the student has satisfactorily achieved each step in this procedure. If the student is unable to achieve this competency, have the student review the materials and try again.

The student:	Yes	No
1. Correctly calculated and recorded primal information.	____	____
2. Fabricated rib according to instructions.	____	____
3. Accurately weighed and recorded cuts.	____	____
4. Correctly computed margin and actual retail cost.	____	____

EVALUATOR'S COMMENTS

____

____

____

PRODUCT EVALUATION

Evaluator note: Rate the student on the following criteria by circling the appropriate numbers. Each criterion must receive a rating of "3" or higher to demonstrate student mastery. (See Performance Evaluation Key.) A student who is unable to demonstrate mastery should review the material and submit another product for evaluation.

Criteria:

Precise weight and record of primal	4	3	2	1
Correctly fabricated and weighed cuts	4	3	2	1
Added cut weight totals correctly	4	3	2	1
Computed margin and ARC correctly	4	3	2	1

EVALUATOR'S COMMENTS

AVERAGE RATING

Evaluator note: To obtain an average rating for the competency profile, total the designated points in "Product Evaluation" and divide by the total number of criteria. Circle the rating on the "Performance Evaluation Key" below.

PERFORMANCE EVALUATION KEY

4 **Skilled** - Can perform job with no additional training
3 **Moderately Skilled** - Has performed job during training program; limited additional training may be required
2 **Limited Skill** - Has performed job during training program; additional training is required to develop skill
1 **Unskilled** - Is familiar with process, but is unable to perform job

WRITTEN TEST

PRICING AND MARKETING ASPECTS OF MEAT PRODUCTS

X

Name ______________________ Score __________

OBJECTIVE 1

Match terms associated with pricing meat products to their correct definitions. Write the correct letters in the blanks.

Part I

___ 1. The value of the offal

___ 2. The weight of the carcass after slaughter

___ 3. Value expressed on a per unit basis (dollars per pound)

___ 4. Refers to total cost (dollars per carcass)

___ 5. Parts of the animal removed from the carcass during slaughter

___ 6. The proportion of the live weight that makes up the carcass

___ 7. Portions of the animal that are not composed mainly of skeletal muscle

___ 8. That portion of the sales income above the purchase price

a. By-product

b. Carcass weight

c. Dressing percent

d. Drop credit

e. Live weight

f. Margin

g. Markdown

h. Net value

i. Offal

j. Offal weight

k. Price

l. Shrinkage

m. Value

May be photocopied for student use.

Part II

___ 1. That portion of the wholesale cost that is added to produce the margin

___ 2. The loss of weight during processing

___ 3. Weight of the carcass after chilling

___ 4. Weight of the carcass immediately after slaughter while the carcass is still hot

___ 5. Weight of the live animal at the time of purchase by the slaughterer

___ 6. The portion of the weight of the original unit (carcass, side, primal, etc.) that is salable product after processing

___ 7. The total cost of buying, transporting, slaughtering, chilling, and handling the offal; it does not include the purchase price of the animal

___ 8. Portion of the original weight that remains after processing

a. Carcass weight
b. Chilled carcass weight
c. Cost
d. Cutting yield
e. Gross yield
f. Live weight
g. Margin
h. Mark up
i. Hot carcass weight
j. Shrinkage
k. Slaughter cost
l. Upgrade
m. Yield

OBJECTIVE 2 **Discuss supply and demand and their effects on meat prices.**

According to the law of supply and demand, what effects on meat prices will occur in the following situations.

1. The United States government allows Australia to export 1 billion extra pounds of beef into the U.S. What will happen to the beef prices and why?

____

____

____

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2. An outbreak of pseudorabies occurs in the corn belt and lowers the number of hogs going to slaughter by 15 percent. What will happen to the price of pork and why?

____

____

3. The U.S. Food and Drug Administration releases a report that states, "the growth hormones used in cattle feedlots will cause cancer." What will happen to retail meat prices and why?

____

____

____

____

____

OBJECTIVE 3 **Discuss factors that influence meat prices at the retail and wholesale levels.**

1. List two factors that might change the cost of doing business for meat processors.

____

____

2. What factor causes the greatest variation in retail meat prices?

____

____

____

____

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OBJECTIVE 4 **State current consumer trends.** List current consumer trends that were identified by your instructor.

OBJECTIVE 5 **Discuss basic advertising principles as they affect meat merchandising.**

1. What are the three main functions of an advertisement?

2. List four kinds of products to advertise.

3. Name the appropriate times to advertise meat products.

May be photocopied for student use.

4. Name three factors to consider when selecting advertising media.

____

____

____

OBJECTIVE 6

Choose the word or phrase to complete statements about cutting tests. Write the correct letter in the blank.

____ 1. Cutting tests are essential for determining

a. maximum profitability
b. maximum market value
c. cutter expertise
d. steps in processing

____ 2. Carcass information includes breed, live weight, sex, external fat thickness, and

a. maturity score, quality grade, and yield grade
b. yield grade and quality grade
c. yield grade and percent of side
d. quality grade, yield grade, and margin

____ 3. Tests are important when changes are made in procedures, equipment, pricing, or

a. transporters
b. personnel
c. shelving
d. packaging

____ 4. Cutting tests are performed **primarily** to

a. set prices
b. determine packaging requirements
c. make management decisions
d. select the best cutter

____ 5. The final portion of the test consists of

a. retail cut, price, and value
b. wholesale weight, percent of side, and value
c. summary of sales value, marketing loss, and margin calculation
d. summary of carcass, wholesale, and retail values

May be photocopied for student use.

OBJECTIVE 7 **Calculate the return on investment for meat products.**

Last year the ABC Meat Processing Company made a net profit of 100 thousand dollars on an investment of 1 million dollars in equipment and facilities. What was ABC's percentage of return on investment?

____

OBJECTIVE 8 **Select from a list correct methods of displaying meats in retail cases.** Write an "X" in the blank before each correct answer.

___ 1. All roasts together regardless of species

___ 2. All beef together

___ 3. Cheaper cuts behind the more expensive cuts

___ 4. All cuts side by side with no different cuts behind one another

___ 5. The freshest meat to the front

___ 6. The oldest meat to the front

___ 7. Display cases that are clean and neat

___ 8. The most prominent display area for sale items

___ 9. The most prominent display area for lamb since it moves slow

___ 10. Roasts mixed with steaks within the same species

___ 11. Cases should be checked once a day

___ 12. Meat should be properly trimmed and packaged

___ 13. Color plays no part in customer preference

___ 14. Cuts in oversupply should be stored in the freezer for later sale

May be photocopied for student use.

OBJECTIVE 9 **Discuss techniques of wrapping retail meats.**

1. Why are red meats wrapped in plastic that is permeable to air?

2. State the three items used in wrapping meat and their purposes.

OBJECTIVE 10 **List information contained on retail meat labeling.** Write five items in the space provided.

May be photocopied for student use.

OBJECTIVE 11 **Choose the word or phrase to complete statements about the shelf life of meat.** Write the correct letter in the blank.

____ 1. Chickens have a shelf life of

a. 6-7 days
b. 9-10 days
c. 12-13 days
d. 14-15 days

____ 2. Chickens have a longer shelf life than red meats because they are

a. packaged with chemical preservatives
b. naturally longer lasting
c. usually packed in non-permeable wrappers
d. not affected by light and temperature changes

____ 3. Ground beef generally has a shelf life of

a. 1 day
b. 2 days
c. 3 days
d. 4 days

____ 4. Most fresh red meat cuts have a shelf life of

a. 2 days
b. 3 days
c. 4 days
d. 5 days

____ 5. Prepackaged specialty meats usually have a shelf life of

a. 1-2 weeks
b. 2-3 weeks
c. 3-4 weeks
d. 4-5 weeks

____ 6. The best method of moving older cuts is to

a. reduce price and sell quickly
b. regrind hamburger and grind steaks
c. recycle it into new cuts
d. cut away exposed meat and resurface

May be photocopied for student use.

____ 7. The major factor in determining the shelf life of a steak is

a. color
b. flavor
c. texture
d. tenderness

OBJECTIVE 12

Compare self-service retailing methods to full-service retailing methods.

Write a paragraph comparing the differences between full-service and self-service retailing of meat.

NOTE: Objectives 13-15 are evaluated on job sheets/assignment sheet in this unit. If you have not completed these components, see your instructor.

May be photocopied for student use.

WRITTEN TEST ANSWERS

PRICING AND MARKETING ASPECTS OF MEAT PRODUCTS

X

OBJECTIVE 1

Part I		Part II	
1.	d	1.	h
2.	b	2.	j
3.	k	3.	b
4.	m	4.	i
5.	i	5.	f
6.	c	6.	d
7.	a	7.	k
8.	f	8.	m

OBJECTIVE 2

1. The increase in supply will lower the price at all levels because of an oversupply.
2. The price of pork will increase because of a reduction in supply.
3. The retail meat price will go down because the report will cause a reduction in demand therefore causing an oversupply.

OBJECTIVE 3

1. Answer should include any two of the following:

- higher wages for employee
- higher cost for supplies
- equipment
- transportation or storage
- changes in government regulation that increase the cost of doing business

2. The cyclical rise and fall of live animal prices is the major cause of fluctuation in retail prices.

OBJECTIVE 4

Answer should include the following:

- Health recommendations against eating high cholesterol foods.
- Increased demand for time-saving packaging and precooked products
- Lower poultry prices due to the mechanization of the industry.

OBJECTIVE 5

1. Answer should include the following:
   - Attract the attention of the customer
   - Inform the customer about your product, service, company, or idea
   - Convince the customer to purchase your product or service or have a good feeling toward your company.
2. Answer should include four of the following:
   - Best sellers
   - Traffic builders
   - New items or services
   - Nationally advertised items
   - Reduced or promotional items
   - Timely products
3. Answer should include the following:
   - Heavy promotional periods
   - Day of the week best suited for your store, products, and customers.
4. Answer should include three of the following:
   - Market coverage
   - Audience
   - Types of business advertising the medium is best suited for
   - Advantages and disadvantages of the medium.

OBJECTIVE 6

1. a

2. a

3. b

4. c

5. c

OBJECTIVE 7

$$\frac{100{,}000}{1{,}000{,}000} \times 100 = .10 \times 100 = 10\ \%$$

OBJECTIVE 8

2, 4, 6, 7, 8, 12

OBJECTIVE 9

1. Permeable wrappings are used to allow oxygen to get to the meat for the desired color change.
2. The three parts of packaging and their purpose are the following:
   - Permeable plastic-Allows oxygen transfer while protecting meat and preventing liquid spills.
   - Tray — Adds to the attractiveness and sturdiness of the wrap.
   - Absorbent Pad-Collects liquid to prevent spills.

OBJECTIVE 10

1. Unit price
2. Total price
3. Cut name
4. Weight
5. Package Date

OBJECTIVE 11

1. c
2. c
3. a
4. b
5. b
6. a
7. a

OBJECTIVE 12

Answer should include the ideas that:

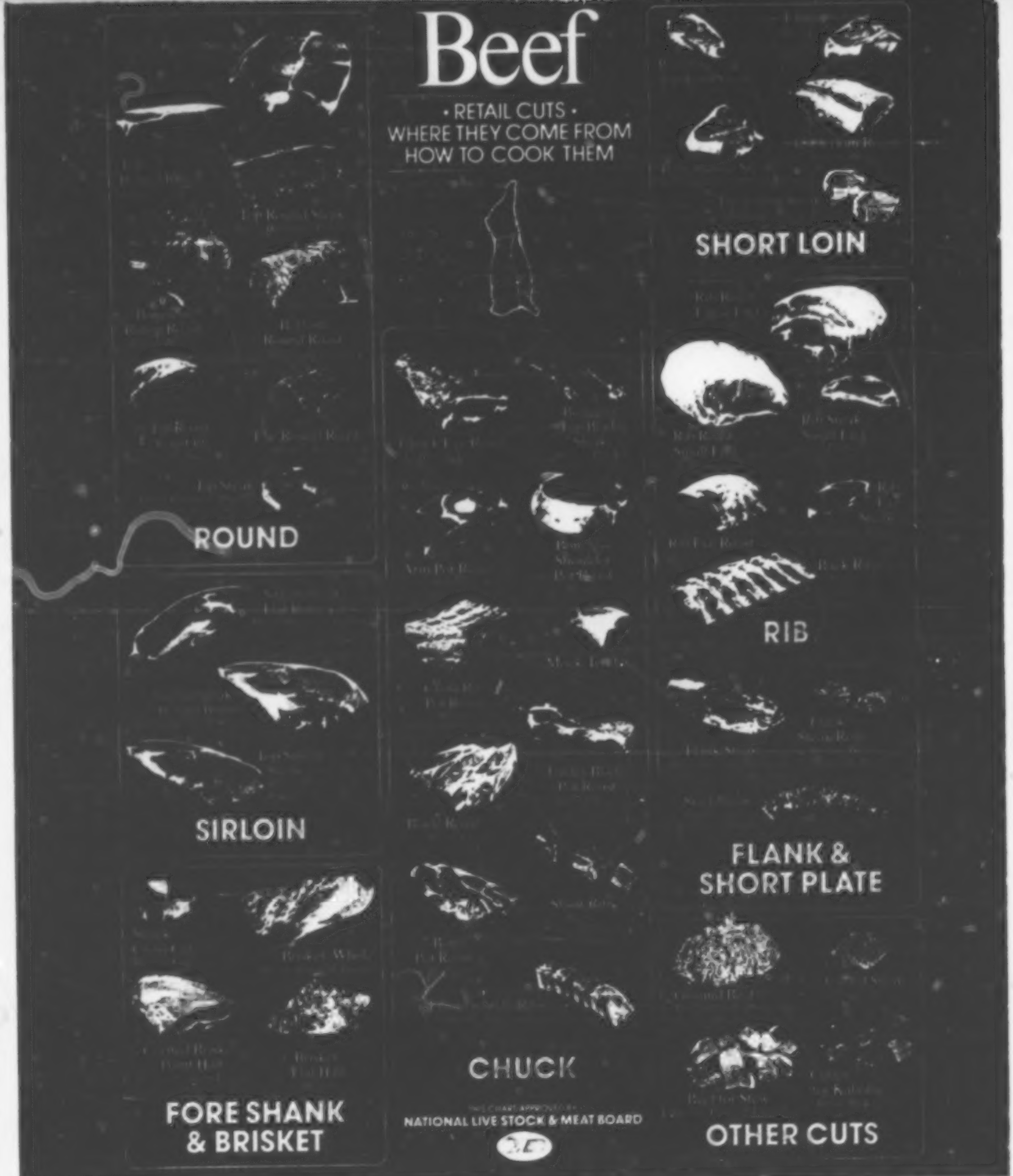
- Self-service involves little custom cutting.
- Self-service is more common today.
- Self-service allows a few employees to handle a large volume of sales.

- Full-service is labor intensive, but is attractive to customers because they can buy exactly what they want.

- Full-service is more expensive but some people will pay a premium for the extra service.

Beef

• RETAIL CUTS •
WHERE THEY COME FROM
HOW TO COOK THEM


ROUND
SIRLOIN
FORE SHANK & BRISKET
SHORT LOIN
RIB
FLANK & SHORT PLATE
CHUCK
OTHER CUTS

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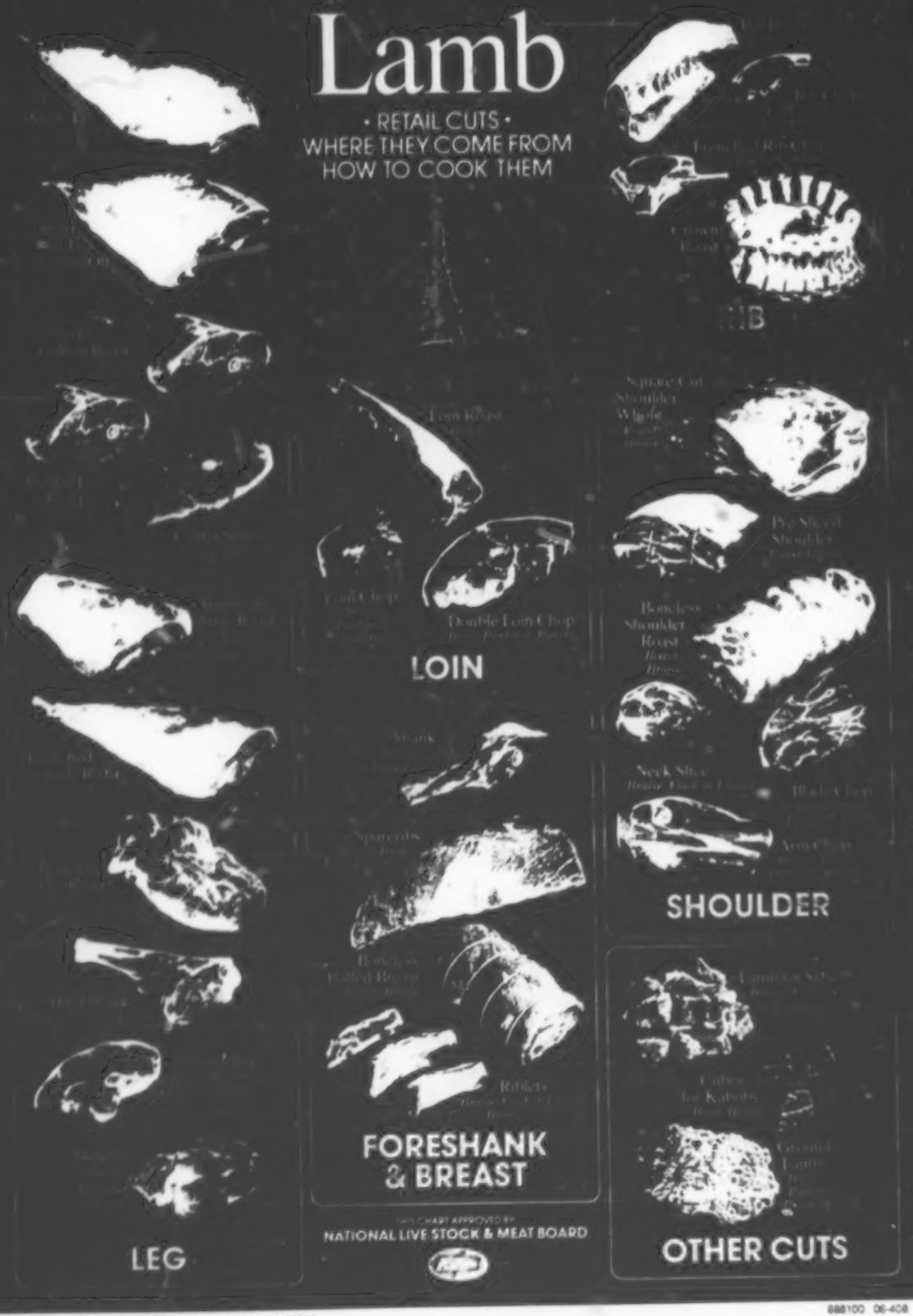
Lamb
• RETAIL CUTS •
WHERE THEY COME FROM
HOW TO COOK THEM
Crown Roast
RIB
Loin Roast
Loin Chop
Double Loin Chop
LOIN
Square Cut Shoulder Whole
Pre-Sliced Shoulder
Boneless Shoulder Roast
Neck Slice
Blade Chop
Arm Chop
SHOULDER
Shank
Spareribs
Boneless Rolled Breast
Riblets
FORESHANK & BREAST
Cubes for Kabobs
Ground Lamb
OTHER CUTS
LEG
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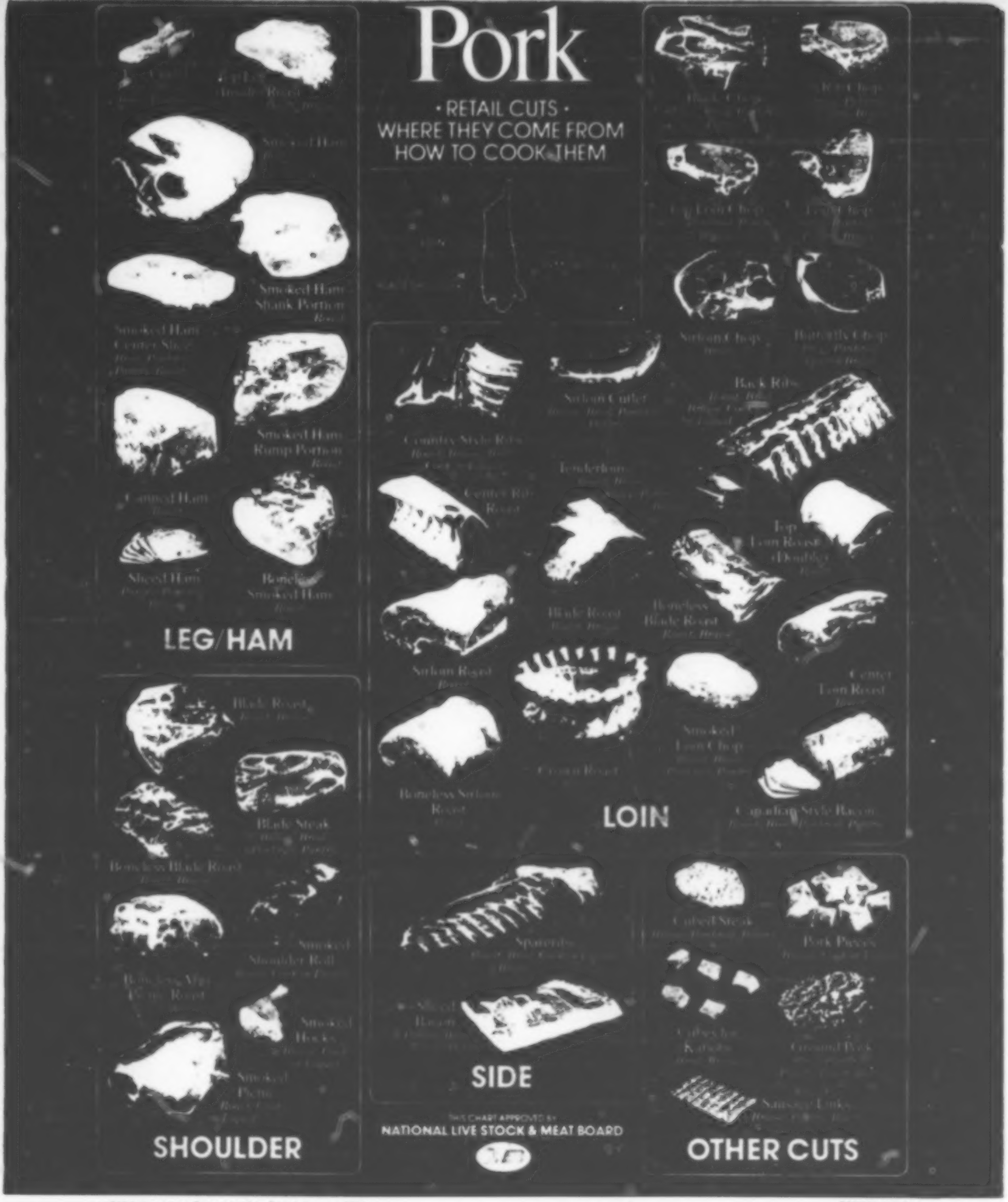
Pork
• RETAIL CUTS •
WHERE THEY COME FROM
HOW TO COOK THEM
Smoked Ham
Smoked Ham Shank Portion
Roast
Smoked Ham Center Slice
Smoked Ham Rump Portion
Roast
Canned Ham
Sliced Ham
Boneless Smoked Ham
Roast
LEG/HAM
Blade Roast
Blade Steak
Boneless Blade Roast
Smoked Shoulder Roll
Smoked Hocks
Smoked Picnic
SHOULDER
Blade Chop
Rib Chop
Top Loin Chop
Loin Chop
Sirloin Chop
Butterfly Chop
Back Ribs
Sirloin Cutlet
Country-Style Ribs
Tenderloin
Center Rib Roast
Top Loin Roast (Double)
Blade Roast
Boneless Blade Roast
Sirloin Roast
Center Loin Roast
Smoked Loin Chop
Crown Roast
Boneless Sirloin Roast
Canadian-Style Bacon
LOIN
Spareribs
Sliced Bacon
SIDE
Cubed Steak
Pork Pieces
Cubes for Kabobs
Ground Pork
Sausage Links
OTHER CUTS
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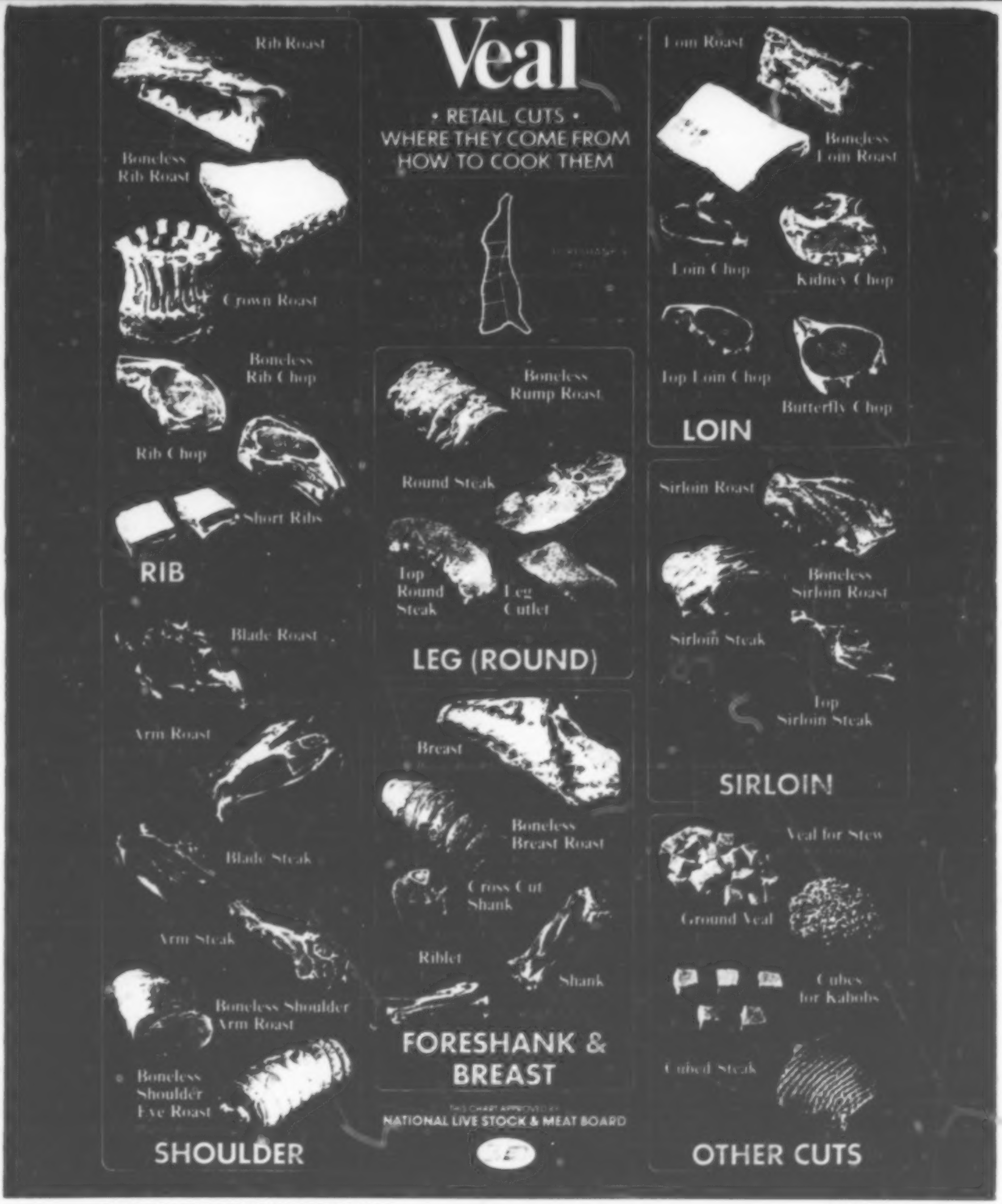

Veal

• RETAIL CUTS •
WHERE THEY COME FROM
HOW TO COOK THEM

RIB
Rib Roast
Boneless Rib Roast
Crown Roast
Boneless Rib Chop
Rib Chop
Short Ribs
SHOULDER
Blade Roast
Arm Roast
Blade Steak
Arm Steak
Boneless Shoulder Arm Roast
Boneless Shoulder Eye Roast
LEG (ROUND)
Boneless Rump Roast
Round Steak
Top Round Steak
Leg Cutlet
FORESHANK & BREAST
Breast
Boneless Breast Roast
Cross Cut Shank
Riblet
Shank
LOIN
Loin Roast
Boneless Loin Roast
Loin Chop
Kidney Chop
Top Loin Chop
Butterfly Chop
SIRLOIN
Sirloin Roast
Boneless Sirloin Roast
Sirloin Steak
Top Sirloin Steak
OTHER CUTS
Veal for Stew
Ground Veal
Cubes for Kabobs
Cubed Steak

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MEAT AND POULTRY PROCESSING

READING SKILLS

WRIT

UNITS OF INSTRUCTION STATE/LOCAL CODES*	Reading Comprehension									Research and Reference								Functional Reading						Language		Composition										
	Gain factual information	Distinguish fact, opinion and inference	Recognize stereotyping and bias	Recognize propaganda	Analyze cause and effect	Draw conclusions	Make generalizations	React to written material	Apply word analysis techniques	Select useful resources	Locate resources	Find materials in library	Use standard references	Use in book reference tools	Use audiovisual media	Use computer data base	Use magazines and newspapers	Interpret forms and records	Follow written instructions	Interpret graphics and symbols	Use content area vocabulary	Interpret abbreviations/acronyms	Read aloud	Use standard grammar and correct spelling, punctuation, and capitalization	State ideas clearly	Use complete sentences	Develop preliminary outline	Use topic sentences	Use introductory/closing paragraphs	Compose reports	Compose essays	Proofread and edit	Construct graphics and symbols	Take notes	Use notecards	Create bibliography
Orientation to Meat and Poultry Processing																		●						●	●	●		●								
Maintain Plant Facilities																								●	●	●								●		
Equipment and Equipment Maintenance													●						●	●																
Purchasing Livestock for Slaughter																			●																	
Livestock Slaughter																			●																	
Quality and Yield Grading														●						●																
Fabricating Carcasses and Box Meat	●																		●																	
Poultry Processing																			●																	
Curing, Smoking, and Sausage Making																			●																	
Pricing and Marketing Aspects of Meat Products																			●					●	●	●							●			

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MC BASIC SKILLS DOCUMENTATIC

NG SKILLS									MATH SKILLS																																						
ch		Functional Writing							Operation and Calculation														Math Application											Data Analysis and Display													
use footnotes	Outline material	Complete forms and records	Write instructions	Write letters	Write job applications	Write resumes	Use word processing	Use computer graphics	Round off numbers	Estimate answers	Use scientific notations	Use exponential notations	Calculate with whole numbers	Calculate with fractions	Calculate with decimals	Convert whole numbers to fractions	Convert whole numbers to decimals	Solve numerical expressions	Solve formulae and equations	Obtain squares and square roots	Convert units of measure	Perform metric calculations	Solve word problems	Select/apply mathematical formula	Select/apply mathematical procedure	Use English and metric measures	Solve time/rate/distance problems	Solve ratio/proportion problems	Solve percent problems	Apply techniques of scaling	Apply algebra principles	Apply geometry principles	Apply trigonometry principles	Interpret charts and tables	Interpret graphs (type)	Collect /record data	Apply sampling techniques	Apply principles of probability	Construct charts and tables	Construct graphs	Calculate statistics	Interpret statistics	Interpret blueprints/plans	Make measurements	Perform banking transactions	Make change	Solve practical problems
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SCIENCE SKILLS

Functional Math										General Science									Life Science							Physical Science					Earth Science							
Calculate gross earnings	Solve income/expense problems	Prepare a budget	Calculate interest	Solve interest problems	Calculate sales tax	Determine income tax	Use calculator for computation	Use computer for computation	Use computer spreadsheets	Apply computing skills	Apply scientific method of inquiry	Conduct experiments	Investigate science ethics	Investigate science history	Investigate/apply economics in technology	Use scientific instruments	Investigate/apply technology	Collect specimens	Identify/classify living organisms	Investigate biological history of the earth	Investigate food chains, webs, pyramids	Investigate/apply principles of human development	Investigate/apply principles of genetics/heredity	Investigate/apply principles of anatomy/physiology	Investigate health issues	Analyze/classify matter	Investigate forms/changes of matter	Investigate forms/changes of energy	Investigate/apply chemical properties	Investigate/apply physical laws	Investigate physical characteristics of the earth	Investigate geological history of the earth	Investigate physical forces acting on the earth	Solve problems of longitude, latitude, and time zones	Investigate conservation of physical resources	Investigate conservation of living resources	Investigate issues of environmental impact	Apply science principles to environmental issues
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ORAL COMMUNICATIONS SKILLS

INTERPERSON

UNITS OF INSTRUCTION STATE/LOCAL CODES*	Oral Presentation									Listening			
	Make informative presentations	Make persuasive presentations	Present personal opinion/viewpoint	Use good speaking techniques	Select/use words effectively	Use effective body language	Present appropriate appearance	Integrate audio and/or visual materials in oral presentations	Adapt presentation to specific audience	Apply active listening skills	Distinguish fact, opinion, and interference	Draw conclusions/make generalizations	Analyze/identify point of view
Orientation to Meat and Poultry Processing										●			
Maintain Plant Facilities							●			●			
Equipment and Equipment Maintenance													
Purchasing Livestock for Slaughter													
Livestock Slaughter													
Quality and Yield Grading													
Fabricating Carcasses and Box Meat													
Poultry Processing													
Curing, Smoking, and Sausage Making													
Pricing and Marketing Aspects of Meat Products													

UNITS OF INSTRUCTION STATE/LOCAL CODES*	Interactive Communication									
	Give/follow oral directions	Apply questioning techniques	Conduct/receive interviews	Analyze/apply nonverbal communication	Work effectively in a group	Communicate with clients/customers/patients	Communicate with co-workers	Communicate with supervisors	Communicate with professional colleagues/associates	Apply telephone etiquette
Orientation to Meat and Poultry Processing		●	●						●	
Maintain Plant Facilities		●	●						●	
Equipment and Equipment Maintenance										
Purchasing Livestock for Slaughter										
Livestock Slaughter										
Quality and Yield Grading										
Fabricating Carcasses and Box Meat										
Poultry Processing										
Curing, Smoking, and Sausage Making										
Pricing and Marketing Aspects of Meat Products										

UNITS OF INSTRUCTION STATE/LOCAL CODES*	General Relating																
	Investigate/apply communication process models	Analyze/apply nonverbal communication	Investigate/apply cross-cultural communication	Interact with co-workers	Interact with supervisors	Interact with clients/customers/patients	Interact with professional colleagues/associates	Interact with family/friends	Participate in group activities	Participate in industrial relations/functions	Identify personal values/attitudes	Apply information to life experiences	Identify values/attitudes	Identify needs/drives	Select/apply appropriate behavior	Investigate/identify personal styles	Investigate/identify primary/
Orientation to Meat and Poultry Processing																	
Maintain Plant Facilities							●										
Equipment and Equipment Maintenance																	
Purchasing Livestock for Slaughter																	
Livestock Slaughter																	
Quality and Yield Grading																	
Fabricating Carcasses and Box Meat																	
Poultry Processing																	
Curing, Smoking, and Sausage Making																	
Pricing and Marketing Aspects of Meat Products																	

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AL OR RELATING SKILLS																		CREATIVE THINKING/ PROBLEM SOLVING SKILLS																				EMI							
Teamwork Cooperation											Leadership Influence							Cognitive Activities																				Job Search, Selection							
corporate climate	Give/receive feedback	Identify hidden purposes	Investigate/apply group dynamics	Control undesirable/ inappropriate behavior	Resolve conflicts	Clarify goals/objectives	Devise "win/win" situations	Build consensus	Generate ideas	Present point of view	Analyze/apply leadership styles	Analyze/apply management styles	Obtain confidence of others	Develop esteem in self/others	Persuade others	Analyze/apply motivation techniques	Provide positive coaching	Collect/record information	Identify critical elements/issues	Define a problem	Identify underlying causes	Apply a problem-solving model	Analyze/synthesize information	Identify/analyze underlying assumptions	Draw conclusions	Predict results/outcomes	Identify/evaluate consequences	Identify/develop alternatives	Evaluate alternatives	Select an alternative	Devise a solution	Create a finished product	Apply intuitive/creative thinking processes	Transfer knowledge/training to new situations	Apply new technology	Develop an action plan	Evaluate results/outcomes	Analyze personal occupational aptitudes/preferences	Investigate employment prospects of a career field/occupation	Investigate training requirements for a career field/occupation	Investigate benefits of a career field/occupation	Compare/evaluate career options	Develop personal career path	Locate appropriate jobs	Analyze duties/requirements/benefits of specific job
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n's Best Competency-Based Instructional Systems for

LOYABILITY SKILLS

Job Acquisition Development

Master specific job task/procedure	Fill in job-related applications	Write letter of application	Write personal resume	Interview for a job	Apply business etiquette	Practice good work habits/attitudes	Develop good personal presentation	Develop self-confidence/esteem	Develop effective leadership	Deal effectively with supervisors	Deal effectively with co-workers	Deal effectively with professional colleagues/associates	Deal effectively with customers/clients
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●						●							
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●						●							

SOCIAL STUDIES SKILLS

Information Analysis

Collect/record data	Interpret graphical information	Construct graphical information	Interpret maps/globes	Interpret statistical information	Analyze/interpret demographic information
●					

Social Studies Application

Investigate/apply U.S. history	Investigate/apply world history	Investigate/apply U.S. geography	Investigate/apply world geography	Investigate/apply principles of government/politics	Investigate/apply principles of economics	Investigate/apply principles of ethics	Investigate/apply principles of psychology	Investigate/apply principles of sociology	Investigate/apply cross cultural studies

Functional Social Studies

Practice responsible personal economics	Prepare a personal budget	Use credit responsibly	Practice good work ethics	Participate in industrial relations	Interact with people of different races/cultures	Investigate/participate in government	Investigate/apply American legal practices	Select/use sources of information on current events	Analyze current events	Analyze consumer issues	Analyze social issues	Analyze conservation/ecology issues	Analyze social impact of science/technology	Analyze economic impact of science/technology
										●				
							●			●				

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